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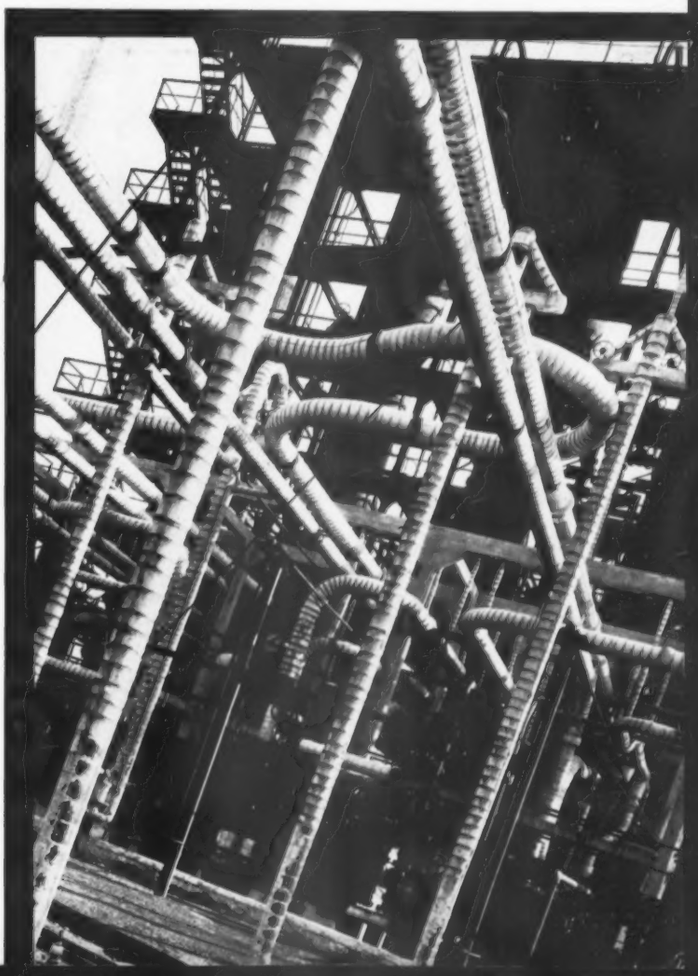
WORLD PETROLEUM

New Oil Empire Being Developed • Kessler Presents Amended Plan for World Oil Stabilization • Iraq Situation Interests European Trade • Motor Fuel's Latest Yardstick of Quality • Petroleum Industry's Shifting Horizon • Huge Storage Cost



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VOLUME III NUMBER 3

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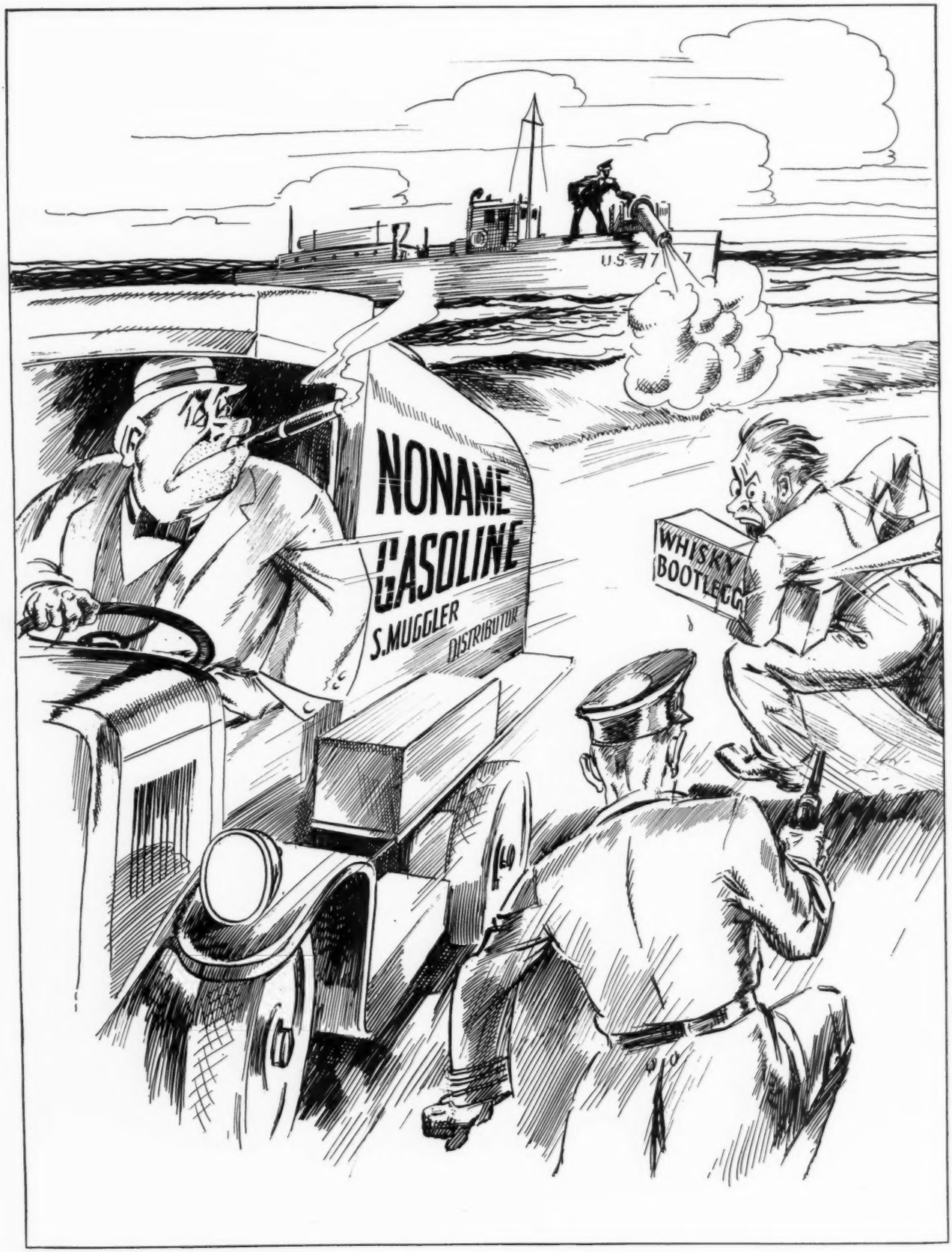

Circumstances alter cases

NEW YORK • WORLD • LONDON

PETROLEUM

Mr. Kessler's Revised Plan

IN SEPTEMBER last WORLD PETROLEUM published an article by J. B. Aug. Kessler, co-director of the Royal Dutch-Shell group, in which he developed the thesis that stabilization of the petroleum industry is a world problem that can be solved only by international cooperation. In the October issue Mr. Kessler followed with a concrete plan of stabilization which attracted widespread attention and has been the subject of much discussion. It recommended itself so strongly to the Roumanian oil industrialists that they sent a cable message to the American Petroleum Institute at its annual meeting in Chicago in November proposing that the latter call an international conference for a discussion of the subject on the basis of the Kessler plan.

Since it was the opinion of the legal members of the A.P.I. directorate that any agreement by petroleum producers looking directly or indirectly to the restriction of production would contravene the anti-trust laws of the United States the Board felt impelled to decline the invitation while expressing sympathy with the proposal for cooperation.

Mr. Kessler now makes a further contribution to the subject which appears in succeeding pages of this issue. The amended plan which he brings forward is intended to meet the objections raised to his first proposal. To do this it omits the petroleum interests of the United States from participation in the plan for regulated production except to the extent of asking an agreement on their part to make no increase above a certain fixed quantity in their present excess of exports above imports. It extends the scope of the proposed control of output by including Russia and a number of lesser producers.

These amendments to the original plan unquestionably bring it more into line with the actualities of the situation. So far as we are aware the restriction of exports is without precedent in the United States and it is improbable, in view of the great number of independent producers, that all of them could be brought into an agreement of the sort proposed. If the sponsors of the stabilization plan were willing to accept the assurance of the major companies engaged in exportation that they would not expand their operations it might be possible to arrive at a satisfactory understanding.

The crux of the stabilization problem appears to be the attitude of the Soviet Union. This assumes particular importance in view of the extensive program drawn up for the expansion of Russian production and Russian exports which apparently is to be carried out regardless of the rise or fall of prices. Roumanian producers already have indicated that they favor the Kessler proposal while Venezuela for more than a year past has been following a policy of restricted output. Other countries mentioned by Mr. Kessler as possible subscribers to the proposed agreement would have reason to follow the lead of the larger exporters since their position probably would not be seriously affected.

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World Survey Needed

INTEREST in the need for solving the world oil problem is growing. Mr. Kessler's particular suggestion may or may not be adopted but in any case the petroleum industry will acknowledge his foresight and initiative in focusing attention on the need for action.

Unfortunately it is more difficult to achieve resource efficiency in the world petroleum industry than it was to apply ratable output to the complex situation in the United States. There is little suitable data on which to predicate action and no generally acceptable international body to provide a forum for discussion, finance the essential preliminary work, and administer a plan should one be agreed on.

Even if the matter were simplified by adopting the Kessler plan with its self-fixing quota principle intact it is difficult to believe that any definite action will be taken looking to a ratable output in all countries until there has been a thorough survey of the basic conditions by disinterested experts.

Less is known about the world situation than was known about the American problem before it was taken up. There are some rough records of production and reserves, but it is doubtful whether there can ever be a fair compromise between conflicting commercial interests until the full facts are known about present and future market needs and until there has been some apportionment of markets on the basis of fitness to serve.

Not enough thought has been given to the preparatory phase of the problem in our opinion. In any plan where sacrifices must be made all around there must be some impartial standard by which the justness of the proposal in individual cases can be judged.

Soviet Exports

ONE of the significant developments of the past two years has been the great rise in the petroleum exports of the Soviet Union which, in 1931, exceeded 40,000,000 bbl., an increase of 17.6 percent over the previous twelve months. In the period 1927–31, when world consumption, outside the United States, reached a peak and then declined, Soviet exports jumped over 25,000,000 bbl. Although 1929–31 was marked by falling sales in most parts of the world Russia's crude output rose 58,750,000 bbl. while Russian refining capacity was enlarged tremendously, standing now at around 190,000,000 bbl. of crude annually, including cracking units of 18,250,000 bbl. capacity. New plants under way will add another 96,000,000 bbl. if completed according to schedule.

Soviet oil products naturally find their principal market in Europe, and the United Kingdom is by all odds their most important European outlet, having taken, in 1931, over 3,600,000 bbl. of motor spirit and other oil products which raised the total of Soviet exports to this country to more than 7,500,000 bbl.

Under the second Five-Year Plan, the Soviets, as outlined elsewhere in this issue, expect to increase production until the output is 630,000,000 bbl. of crude in 1937, compared with 156,904,390 bbl. actually produced in 1931. In view of this enormous program it seems essential that the Soviets be included in any plan of world curtailment or rational marketing that may be attempted for the stabilization of the oil industry.

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Campaign on Tax Evasion

WHEN the fight against gasoline tax evasion began in the United States it was looked upon as a sporadic evil which had attained serious proportions only in a few localities. Many oil company officials, no more than six or eight months ago, held the opinion that in the greater part of their marketing territory tax evasion was of such petty proportions that it hardly deserved serious consideration.

A different complexion was put upon the matter when the investigation conducted by the Chicago DAILY NEWS revealed that in that city and the marketing area immediately surrounding "bootlegging" of gasoline had become an organized business of great proportions, employing a big fleet of tank trucks, having its own bulk distributing stations, and defrauding the taxpayers of Illinois and adjoining states of millions of dollars.

Since the oil companies operating in the Chicago area began a systematic campaign against the tax evader, and particularly since the American Petroleum Institute at its meeting last November authorized the organization of this movement on a nation-wide basis, the ramifications of the system of tax evasion have been found to be far more widespread than was even faintly suspected. Thus far the work of making hard the way of the tax evader has been organized in forty-five of the forty-eight States of the Union and plans are formulated for extending the campaign to the other three States. In some few cases tax evaders have been convicted and prison terms imposed and in many States the selling of gasoline on which no tax has been paid has become a hazardous undertaking.

While the collection of gasoline taxes is primarily the duty of the States that levy them the matter is one of concern to the petroleum companies because it has been found that the avoidance of taxes is closely related to the price cutting that has upset the marketing situation in many parts of the country.

The whole system of tax evasion—and careful investigation has shown that it is an organized system in many parts of the country—attracts to the gasoline dispensing business a vicious and undesirable element that will be ready to resort to any kind of dishonest practice that promises a temporary profit. In attempting to uproot the evil the oil companies are carrying on a constructive work and one that should be prosecuted vigorously for the good of the industry.

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High Taxes and Evasion

ONE aspect of this subject deserves special attention at this time when State Governments in search of revenues to cover their growing deficits are increasing taxes on gasoline, and even the Federal Government is considering a levy on this commodity, already overburdened with taxes. The higher the tax the greater becomes the incentive to evasion. By a strict enforcement of the laws already on their statute books many States undoubtedly would be able to obtain as much revenue as they will derive from increased taxation laxly enforced. Adoption of uniform methods of tax collection and cooperation between the States to prevent the wholesale evasion that is made comparatively easy by the present jumble of tax regulations are urgently needed, both for the protection of the taxing powers and to prevent demoralization of the business of gasoline distribution.

▼

Company Accounting

VAST changes in market values during the past two years have directed attention to changes in oil company accounting that seem to be needed in order that company records and annual reports may reflect more accurately existing conditions and operating results during the period which they cover. The acute fall in the price of crude oil and manufactured products since 1929 has required heavy write-offs, for example, in the inventories of most of the petroleum companies which have accentuated their unfavorable financial showings. If surplus stock is carried in store it is proper, of course, that changes in market value should be reflected in the company's balance sheet. As was pointed out, however, in an article published by WORLD PETROLEUM a few months ago (December) an integrated oil company finds it necessary at all times to carry a considerable supply of oil in the ordinary conduct of its operations, including that which is in its pipe lines or in process at the refineries and whatever amount is necessary to meet the current demands of its marketing organization. As the writer suggested, this oil really represents part of the operating plant of the company and might well be so considered in operating accounts.

Attention is directed to another phase of the subject by the action of the Barnsdall Corporation in writing down the book valuation of its leaseholds to $1, eliminating annual depletion charges. In future, it is stated, the company will charge leases and lease development to operating expense. The admitted difficulty of determining with any close degree of accuracy the proper charge for depletion is given as the primary reason for this change in the accounting system of the company which is to be made in conjunction with a revision of its capital structure. As President E. B. Reeser points out, it does not alter the real value of the company's securities but will enable annual reports to reflect a more accurate picture of operating results.

The process of deflation through which we are passing is likely to compel a readjustment of the capital set-up of many companies. The occasion thus presented is one of which they may well take advantage to put their accounting systems in shape to reflect with as complete accuracy as possible the results of actual operation from year to year, free from extraneous influences which may involve extensive book fluctuations without a corresponding alteration in actual condition.

Kessler Offers Amended Stabilization Plan

Participation of United States Limited to Restriction of Export Balance—Would Include Soviet Union and Lesser Producers.

By J. B. Aug. Kessler

APPLYING to economic subjects the method of thought and of treatment that the trained mind of the engineer brings to the solution of technical problems in his own profession, J. B. Aug. Kessler has worked out an original and striking program for avoiding the wasteful losses resulting from overcompetition in the international petroleum trade. His original proposal for dealing with the present unsatisfactory situation was published in WORLD PETROLEUM in October last. The accompanying article outlines an amended project of broadened scope which is designed to overcome objections raised to his first plan. Its distinctive feature is the avoidance of complicated operating mechanism to the extent that after being set in motion it would be practically self-executing. Mr. Kessler's original thinking has not been confined to the subject of petroleum. He recently contributed to the London TIMES a plan for the liquidation of war debts, which had the unique distinction of eliminating the one great obstacle that has prevented the fulfilment of these obligations. The following article is presented by Mr. Kessler as a personal contribution to the important cause of improving the state of the world oil industry.

IN October, 1931, I published in WORLD PETROLEUM a plan for international cooperation by the world oil industry. This plan was based on the conviction now widely held by leading oil industrialists that prosperity cannot be brought back to the oil industry as a whole by an attempt to establish order in the distributing markets only. All such attempts must fail if primarily overproduction is not brought to an end and the balance between supply and demand restored. One cannot stem an overflowing river by building a dam across it.

Although it was recognized in the oil-producing countries who would have cooperated under my scheme, that it provided a simple and effective means of restoring the balance between supply and demand of oil, it was found that the laws in the United States did not admit of its application, as the form of international cooperation which I indicated was contrary to the laws regulating inter-company and inter-state relationships in the United States.

IN view of the impossibility of the United States oil industry cooperating under my original scheme, I submit on the basis of the following statistics, a method by which this industry can take its place in a plan for world cooperation which will do no more and no less than speed up the normal functioning of the economic law of supply and demand towards balancing supply and demand. Under this plan the balance between supply and demand would be promptly restored while avoiding the waste of irreplaceable riches.

For the years 1929, 1930 and 1931 import and export figures of the United States were as follows:

United States Imports and Exports for Three Years

IMPORTS	1929 Barrels	1930 Barrels	1931 Barrels (Estimated)*
Crude	78,932,572	62,129,419	46,837,400
Gasoline	8,834,302	16,926,800	13,994,600
Kerosene	208,008	200,086	12,500
Fuel and Gas Oil	20,545,498	26,080,383	24,996,600
Other Products	44,557	173,721	74,800
Total Crude and Products	108,564,937	105,510,409	85,915,900
EXPORTS			(Estimated)*
Crude	26,394,349	23,704,162	26,688,300
Gasoline	60,006,674	63,197,033	44,996,200
Kerosene	19,820,352	16,688,994	12,975,200
Gas and Fuel Oil	35,714,784	32,377,758	27,139,200
Other products	10,835,328	9,901,780	8,184,300
Total Crude and Products	152,771,487	145,869,727	119,983,400

* See page 128 for U. S. Department of Commerce figures.

IN the international agreement that I now propose, the only place that the United States need take, and the only undertaking that they need give is the following: (I have received very authoritative American legal advice that this proposal is on all fours with United States laws).

The United States oil industry undertakes that the total of the United States *exports* of crude, gasoline, kerosene, gasoil and fuel oil and "other products" during any quarter will *not be more* than the following:

Crude Oil—Not more than the imports of crude during that quarter.

Gasoline—Not more than the imports of gasoline during that quarter plus 50 percent of the balance between the crude imports and crude exports during that quarter plus 6,000,000 bbl.

Kerosene—Not more than the imports of kerosene during that quarter plus 20 percent of the difference between crude imports and crude exports during that quarter plus 2,000,000 bbl.

Gasoil and Fuel Oil—Not more than the imports of gasoil and fuel oil during that quarter plus 20 percent of the difference between crude imports and crude exports during that quarter.

Other Products—2,500,000 bbl.

If this proposal were adopted it follows that an import duty or a prohibition of import into the United States cannot unbalance the world arrangement (about which more later) nor would it cause any hardship for the United States.

This proposal really means that the United States is given a first call on export markets to the extent of a certain quantity per quarter of gasoline and kerosene and of "other products" (viz. 6,000,000 bbl. of gasoline, 2,000,000 bbl. of kerosene, and 2,500,000 bbl. of "other products").

As it is not at all unlikely that world consumption will continue to drop for a certain period, this first call on the export markets is a great advantage to the United States, and in order to prevent the possibility that the United States, after making use of this advantage, might cancel the arrangement as soon as world consumption went up again, it is clear that the United States oil industry should undertake not to cancel the agreement for a period of, say five years.

For the purpose of cooperating with the rest of the world under this plan the United States oil industry should revive the now dormant export petroleum association and vest in it the necessary authority to represent the United States oil industry as one cooperating unit under this plan.

It is proposed that all other oil-producing countries whose exports are larger than their imports shall cooperate under the plan.

In my original plan I left Soviet Russia out for several reasons. Many of the comments on my scheme received from various quarters express the opinion that without Soviet Russia it could not work satisfactorily. I therefore now propose that Russia shall take its place with the other producing countries cooperating under the scheme.

The countries, therefore, that would be parties to the Agreement are:—

U. S. A. (on special conditions in accordance with U. S. laws)	D. E. I.
Venezuela	Colombia
Russia	Peru
Persia	Trinidad
Roumania	Poland
Mexico	Sarawak
	Ecuador

The oil industry in each of those countries should appoint fully authorized representatives for an international meeting.

There are only two prerequisite conditions for this international meeting.

The first is that the oil industrialists of these countries honestly believe that an endeavor should be made to bring world production, excluding the United States, down to a figure equal to "normal" world consumption, excluding the United States. Lower down I shall explain what I understand by the "normal" world consumption.

The second is that each group (with the exception of the United States) undertake to get its Government to prohibit drilling so long as production is above the figure which is considered by the oil industrialists of that country (and by them alone) as the minimum production to which they are entitled under the world oil conservation scheme. As the only undertaking which is asked from the United States oil industry is that it shall not export more than a certain quantity, as mentioned above, any arrangement about production or prohibition of drilling need not be entered into by the United States oil industry.

As an alternative to such a prohibition of drilling a tax on drilling of not less than say $30 per foot may be considered. An obvious disadvantage of a drilling tax is that it may become permanent, which would mean a lasting burden for the oil industry. On the other hand it may be difficult to get Governments to prohibit drilling (under certain conditions) altogether. In fact both alternatives have their advantages and disadvantages.

I want to emphasize that each country can fix for itself its minimum production. The lower it is fixed the more easily my scheme will work, but however it may be fixed the scheme will still not only be workable, but the only prompt "way out" of the present troubles that I have heard of, and that will save the industry before there are so many casualties that the Governments are bound to interfere (to a far larger extent than by temporarily prohibiting or taxing drilling as long as there is overproduction).

The international meeting will first of all ascertain how much the representatives of each participating country (excluding the United States) consider their country should produce under the world conservation scheme. Each representative will table this figure, hereinafter called the "declared minimum."

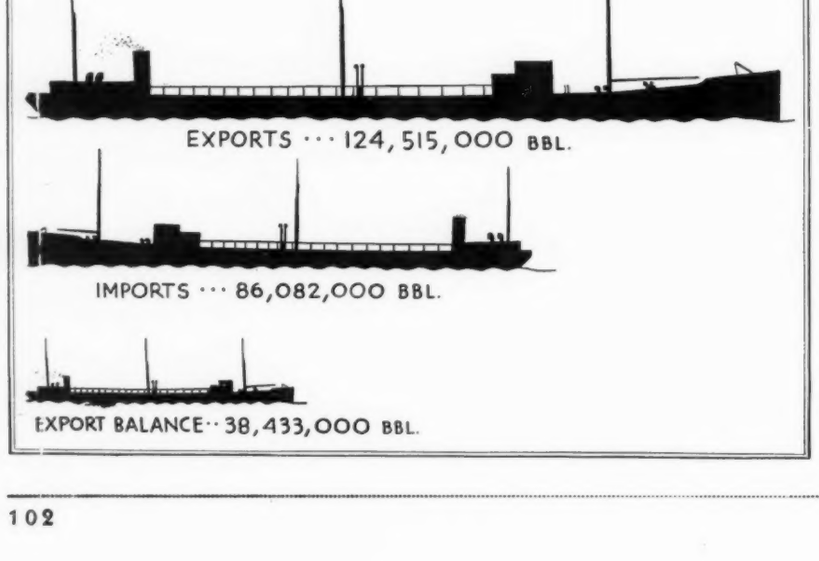
Let us assume that these claims in barrels per day amount to:

	Barrels per day
Venezuela	368,000
Russia	373,000
Persia	116,000
Roumania	108,000
Mexico	85,000
D. E. I.	100,000
Colombia	52,000
Peru	27,000
Trinidad	24,000
Poland	11,000
Sarawak	14,000
Ecuador	4,000
	1,282,000

This is equivalent to 468,000,000 bbl. per annum.

From the part which the United States oil industry would take in this plan, as mentioned above, it is clear that the world's oil markets, excluding the United States home market, are affected by United States production to the extent of the excess of United States exports over imports, i.e. 6,000,000 bbl. gasoline plus 2,000,000 bbl. kerosene plus 2,500,000 bbl. of "other products"=10,500,000 bbl. of products per quarter or 42,000,000 bbl. per annum.

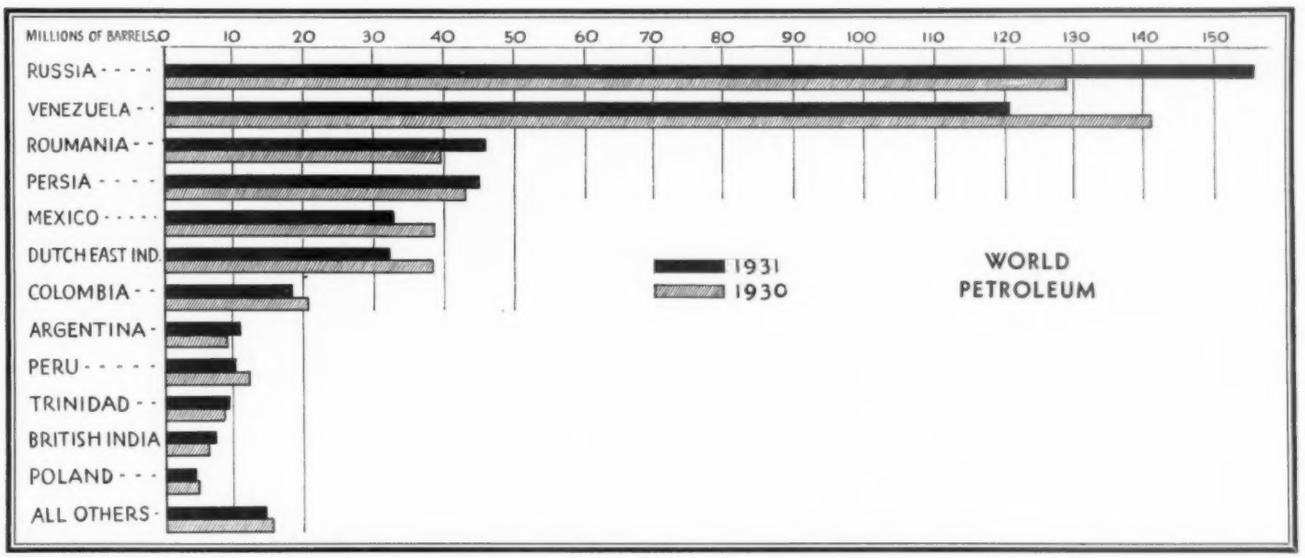
The total quantity of oil produced affecting the world market outside the United States would therefore be the sum of the above "declared minima," i.e. 468,000,000 bbl. per annum plus the excess of United States exports over imports, i.e. 42,000,000 bbl. per annum= 510,000,000 bbl. per annum.


COMPARISON OF UNITED STATES PETROLEUM IMPORTS AND EXPORTS ··· 1931
EXPORTS ··· 124,515,000 BBL.
IMPORTS ··· 86,082,000 BBL.
EXPORT BALANCE·· 38,433,000 BBL.

It is beyond discussion that the flood of surplus oil today has caused it to find an outlet outside its "normal" use. This has been made possible only by this surplus oil being sold at such low prices as to displace other products (mainly coal) and simultaneously bringing down the entire price structure of the world's oil market to a disastrous level.

In order, therefore, to conserve the world's oil riches for the world's "normal" requirements, one of the tasks of the international meeting must be to ascertain the production necessary to satisfy the "normal" consumption of the world outside the United States. Let us assume that the figure so established is 100,000,000 bbl. per annum below the abovementioned "declared minima" plus the agreed exports from the United States, plus the production in those countries where imports are larger than exports. In other words, by producing during the next 12 months 100,000,000 bbl. less than their "declared minima" the countries cooperating under the conservation plan would cause world production to be in line with "normal" world consumption.

These 100,000,000 bbl. by which the "declared minima" of these countries exceed the "normal" world consumption is what may be



Comparative crude oil production by principal producing countries other than the United States for 1930 and 1931.

called the "top" of their production—that is to say, that part of their production that costs them least of all. It is, so to say, the production which they can get by opening up their wells just a little more. I think I may assume that the average cost of that part of their oil is not more than 20 cents per barrel. In calculating the net back on the products contained in this "top" of the crude production, the cost of refining need not be charged with any of the overhead expenses of pumping and refining that crude. However low, therefore, the returns are, I think I may assume that the production and selling of the products contained in the "top" of their crude production still leaves the producers a return of say, 40 cents per barrel, or, in other words, a cash profit of 20 cents per barrel.

In order to induce the producers of the above mentioned countries not to produce the 100,000,000 bbl. (which we have found to be the "declared yearly overproduction") those producers would therefore have to be offered 20 cents per bbl. as an indemnity for not producing that quantity. The moment, however, that the industry has come together on such a scheme one may assume that prices would improve and that therefore the calculated profit of 20 cents per barrel would no longer be good enough to induce producers to restrict their production. I assume that my calculated profit of 20 cents per barrel would, as a result of the world-wide arrangement, increase at once (by a rise in the price of products) to 40 cents per barrel. We should therefore have to offer for each barrel by which the actual production remains below the "declared minima" a payment of 40 cents per barrel. The "declared yearly overproduction" being 100,000,000 bbl., the "declared overproduction for a quarter" is 25,000,000 bbl., and that multiplied by 40 cents per barrel gives an amount of $10,000,000. This amount would have to be available before the beginning of the first quarter year of the arrangement in order to have a sufficiently strong financial inducement to bring overproduction to an end, and is to be found by the oil industry in each of the countries cooperating under the plan, and also the United States, paying respectively an amount of about 8 cents per barrel on the quantities represented by their "declared quarterly minimum" and an equal amount per barrel on the agreed quarterly excess of United States exports over imports, i.e. $\frac{510,000,000}{4}$ x 8c = $10,000,000. In other words, on the "declared quarterly minima" plus the "agreed quarterly excess of United States exports over imports," i.e. $\frac{510,000,000}{4} = 127,500,000$ bbl. the oil industry in the above countries would have to pay into the central fund before the beginning of the first quarter 8 cents per barrel.

If any of the countries represented considers the total sum to be found by it as too great a burden, it can reduce this sum by decreasing its "declared minimum production."

THE oil industrialists in each of the countries mentioned (with the exception of the United States) undertake to get their respective Governments to prohibit drilling altogether or alternatively to put a tax of at least $30 on each foot drilled as soon and as long as the production of that country is above its "declared minimum." Otherwise every country is free to produce whatever it chooses—i.e. below or above its "declared minimum." I rely on the prohibition of drilling or alternatively on the tax on drilling to act as a powerful brake for the producers not to go above their "declared minimum," but there need be no undertaking on the part of anybody not to produce more than the "declared minimum."

THE fund accumulated before the first quarter is, at the end of the quarter, distributed pro rata to those countries which produced less than their "declared minimum" if during that quarter the total production of all the countries together has been less than their "combined declared quarterly minimum." The existence of this fund will work as an inducement for producers to produce less than their "declared minimum" in order to participate in the distribution of the fund at the end of the quarter and it is therefore a practical certainty that the total production of all the countries together will be less than their "combined declared quarterly minimum," in other words, it is a practical certainty that the first quarter's fund will be divided after the end of the first quarter and consequently that those who cooperated to bring overproduction to an end will get their just reward. The United States will not participate in the distribution of the fund.

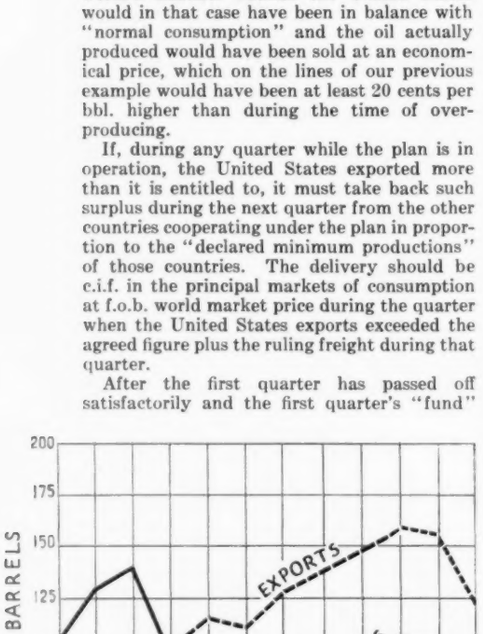
Suppose that during the first quarter all countries have produced up to their "declared quarterly minimum," with the exception of Venezuela having produced 7,000,000 bbl. below its "declared quarterly minimum," Persia 2,000,000 bbl., Dutch East Indies 3,000,000 bbl., Trinidad 1,000,000 bbl., and Roumania and Mexico respectively 3,000,000 bbl. and 2,000,000 bbl. below their "declared quarterly minimum." In total, therefore, the production of all countries cooperating under the plan has remained 18,000,000 bbl. below the "declared quarterly minimum." The available fund of $10,000,000 would, therefore, be paid to the oil industry of Venezuela, Persia, Dutch East Indies, Trinidad, Roumania and Mexico pro rata to the differences between the "declared quarterly minima" and the actual production of each of these countries. Therefore, producers who actually applied conservation in each of these countries would be paid on the same basis, and on an average they would receive: $\frac{\$10,000,000}{18,000,000} = 55$ cents for each barrel for which their production was below their "declared quarterly minimum."

If all the countries together should have produced during the first quarter just $\frac{100,000,000}{4}$ bbl. = 25,000,000 bbl. less than their combined "declared minimum," then on an average each of the operators applying conservation would receive out of the fund 40 cents for each barrel which they produced less than their

"declared minimum" which is just the figure which I calculated was the profit they agreed to forego by producing less than their "declared minimum." The production for the world's markets outside the United States would in that case have been in balance with "normal consumption" and the oil actually produced would have been sold at an economical price, which on the lines of our previous example would have been at least 20 cents per bbl. higher than during the time of overproducing.

If, during any quarter while the plan is in operation, the United States exported more than it is entitled to, it must take back such surplus during the next quarter from the other countries cooperating under the plan in proportion to the "declared minimum productions" of those countries. The delivery should be c.i.f. in the principal markets of consumption at f.o.b. world market price during the quarter when the United States exports exceeded the agreed figure plus the ruling freight during that quarter.

After the first quarter has passed off satisfactorily and the first quarter's "fund"



Trend of U. S. crude imports and exports 1920–1931.

has been distributed among the producers who applied conservation it is reasonable to assume that as a result of higher market prices for oil we shall have to offer the combined producers of each of the above countries during the second quarter a bigger reward than 40 cents per barrel in order to induce them to remain producers below their "declared minimum." Once prices have improved, however, it will be much simpler for the oil industry in these countries to find an amount considerably larger than $10,000,000 as payment into the fund for the second quarter. In other words, once the fund has been started satisfactorily I do not expect any difficulty in its continuation. It might be considered advisable however to limit the compensation per barrel for producing below the "declared minimum" to not too high a figure.

I propose that the scheme shall be continued for quarterly periods until for a period of six consecutive months the free market price of liquid fuel f.o.b. in the Gulf of Mexico (or such other market as may be considered as most correctly representing the world market price) has been at least $1.00 per barrel and during the same period the price of 64 deg. Beaume gasoline has been not less than eight cents per gallon. After these prices have existed for at least six consecutive months for both fuel oil and gasoline simultaneously the scheme would be called off, but would be re-introduced as soon as prices again fell below these critical levels.

A necessary condition is to be made as to the right of every country, excluding the United States, to cancel this scheme. The stock position in the United States must be kept within such limits as not to become a menace overhanging the rest of the world's markets if at any time the scheme should be called off. The producers outside the United States must be secured against the possibility, while they are limiting production and drilling, that the United States may accumulate still larger stocks, with which, if at any time the scheme should be called off, the markets outside the United States could be flooded. Therefore, as soon as the total stocks of crude and products in the United States exceed 620,000,000 bbl. (approximately to-day's total) any country other than the United States must have the right to give notice of termination of the scheme by the end of the quarter year during which this figure was exceeded. This condition will also clearly demonstrate that this plan will in no way result in any restraint of trade in the United States; on the contrary. As stocks may not go above a certain level without running the risk of seeing the scheme cancelled, this condition will be an inducement to stimulate the outlet on the interior market.

As soon as the scheme is called off, the prohibition of drilling, or alternatively the tax on drilling, is to be called off. The simple machinery by which the international oil meeting controls the operation of the plan must, of course, be kept intact, even during such times as the plan is not functioning as indicated in the previous paragraph, so that at any time when prices have again dropped below the economical level, the plan will be reinstated.

It is reasonable to assume that some of the smaller companies, however anxious they may be to join the scheme, would find it difficult to find before the beginning of the first quarter an amount of eight cents per barrel for their "declared minimum." Very likely some companies are already in the hands of the banks to a very large extent and might find the banks unwilling to provide the money for their payment into the fund. In order to avoid such difficulties, which would wreck the whole scheme, I suggest that the major companies inside and outside the United States should form an "International Oil Industry Finance Syndicate" which would undertake to finance the payments into the fund of such weaker and smaller companies in case they cannot find accommodation with the banks, on certain "maximum conditions" to be fixed beforehand by the "International Oil Industry Finance Syndicate." The syndicate would undertake to do such financing on those "maximum conditions" against which they would take a first mortgage on the properties of the companies that want such financing. The improvement in the industry that my scheme would effect would most likely result in those smaller companies paying off their debt when it falls due after the quarter for which the advance is made, but if by any chance they could not pay off the syndicate would foreclose and it would sell such properties to the highest bidder.

The total amount that the "International Oil Industry Finance Syndicate" would have to find would be by no means unreasonably large. As I mentioned above, the total amount to be paid into the fund for the first quarter might be something like $10,000,000. The major companies, of course, would be able to find their own subscription and I therefore take it that it is not exaggerated—in fact I think it very much under-estimated—to assume that half of the required amount will come in without the least difficulty. That would leave $5,000,000 to be found by getting credit either from the banks or from the "International Oil Industry Finance Syndicate." Of this syndicate all the major companies of the world would be members and it is therefore clear that this group of very powerful oil companies would not have the slightest difficulty in finding the finances for an advance of $5,000,000.

I still want to deal with the following possibility. It is conceivable that some insincere industrialist would reason as follows:

> "I know that I am able to produce only 300,000 bbl. per annum, but I declare to my National Representative that I consider that my minimum production is to be 3,000,000 bbl. I will then pay into the fund 3,000,000 x 8 cents per bbl.=$240,000. I will produce only 300,000 bbl., and I will therefore draw for producing below my 'declared minimum,' 2,700,000 x 40 cents per bbl.=$1,080,000 which will give me a handsome profit of $840,000 for nothing."

Such an insincere industrialist would, however, take a tremendous risk—such a risk that I think he would never play such a trick.

As I have described above, the payments out of the fund are not paid by the fund to each of the industrialists who produced less than his "declared minimum" but to the combined industrialists of each of the participating countries that have produced less than their "declared national minimum." Our insincere industrialist may therefore be caught in the following way: although he has produced 2,700,000 bbl. below his dishonest "declared minimum," the other industrialists in his country may have produced 2,700,000 bbl. more than their "declared minimum" with the result that the total production of the country in which our insincere industrialist works has been up to and possibly even over that country's "declared minimum." Our friend would therefore find that he would not get payment out of the fund at the end of the quarter, but that he would have contributed to the fund an amount of 3,000,000 x 8 cents per bbl.=$240,000 which would be a clean loss to him. I therefore take it that we can assume that nobody will dare to declare a minimum which he knows he cannot produce.

There is another point that requires discussion. Suppose the representatives of country X, in preparation for the international meeting that would put my scheme into effect, come together. As there are a number of small operators in that country one cannot assume that 100 percent of the producers will be present. Suppose 95 percent are represented and come to the conclusion that their country's "minimum" should be 100,000 bbl. per day. But what about the five percent not present? And what about any new fields that may be discovered during the first quarter's operation of the scheme? The meeting of that country's operators may then decide in the following way: They may either ignore

the five percent that are absent and the not-yet-discovered oilfields and declare as their country's "minimum" 100,000 bbl. They will then have to find among themselves for the first quarter's production (91 days) 100,000 x 91 x 8 cents=$728,000 and prohibition of drilling, or alternatively a drilling tax of at least $30 per foot is introduced in that country as soon as that country's production is above 100,000 bbl. per day. If the meeting of operators thinks it wise to leave more room for the absent five percent and for the new fields that may be discovered, they are perfectly free to fix their minimum at, say 120,000 bbl. In that case the prohibition of drilling, or alternatively the tax on drilling, will start only when the production goes above 120,000 bbl.; but on the other hand they will have to find as a participation in the fund 120,000 x 91 x 8 cents=$873,600.

Of course these last two calculations are not perfectly correct because the figure of 8 cents a barrel would be affected to a minor extent by the higher "minimum declaration" of the particular country's producers. However, in order to explain my proposal I do not think it is necessary to go into this mathematical detail.

ALTHOUGH I expect that the application of my scheme will cure matters within a reasonably short time, we must consider what would happen if the scheme were still working at a moment when, in a country which up to now has not produced oil, a major oilfield were brought in, thus placing that country among the world's oil suppliers—e.g. Iraq. Such an occurrence need not upset the scheme at all. Suppose the Iraq pipelines are built and ready for operation with a capacity of 28,000,000 bbl. per annum, then all that has to be done is that the "Iraq Oil Industry" become members of the scheme with all its rights and obligations; that is to say they pay as contribution to the fund for a minimum production of 28,000,000 bbl. per annum, or as many barrels as they decide themselves, and draw from the fund if their production remains below their "declared minimum." Of course the smaller their "declared minimum" the easier things will be in general, but just as little as a large "declared minimum production" for any of the other countries would upset my scheme, so little would a figure of 28,000,000 bbl. for Iraq upset it. Of course its appearance on the scene would affect the contribution per barrel for all the participants, but not to an extent which would endanger the scheme.

As the Iraq production is controlled by a small number of world oil interests, in this case instead of getting the Iraq Government to prohibit drilling or alternatively to levy a tax on drilling as soon as production rose above the "declared minimum Iraq production," it might be arranged that the Iraq producers would give a binding undertaking that on no condition would they produce more than their "declared minimum" production as long as the scheme is in operation.

A similar binding undertaking might be given by the Dutch East Indies, Colombia, Persia and all those countries principally controlled by one or two producing groups. For all those countries, there would in that case be no need to give the undertaking that under certain conditions a drilling tax or prohibition would be instituted, as such "certain conditions" could not arise.

THIS scheme is not intended to supersede any other arrangements that exist already or may still be made to bring production into balance with consumption. Such arrangements, including a State compact in the United States, will work equally well and with more purpose with my scheme than without it.

IT may be claimed for this plan that it has the merit of obviating the risk of exploiting the consumer, because, as soon as a "normal" level of prices is reached, the arrangement is called off and all producers regain complete freedom of action, and the plan only becomes operative again when prices drop below a certain emergency level. Therefore, supervision or interference by Governments will not be necessary. Furthermore, the scheme can be put into effect without delay as it need not wait for any change in the laws of the United States. It will not only save the oil industry, but will be of great help to the coal industry, as it will restore to the latter industry all those previous buyers of coal who only went over to oil on account of its absurdly low price.

IN conclusion, I would mention that in recent times, in various fields of industrial activity, different plans have been proposed to balance production with consumption.

I am in entire agreement with the criticisms which have denounced most of those schemes as cumbersome and hence probably unworkable on account of the complicated systems of control which they necessitate in order to put artificial brakes on production.

As the plan I have outlined takes full account of the functioning of economic laws, and only speeds up the result which economic laws bring about over a longer period, my plan does not require any complicated machinery.

The chief elements this plan requires to restore the balance between production and consumption are:

First, that the international oil industry has the conviction that only an international agreement can put things right.

Second, that a fund be created to speed up the normal reactions of the law of supply and demand.

Third, that the United States industrialists accept the export position I have outlined, until such time as their laws will permit them to join the scheme on the same conditions as all the other countries.

Fourth, that the drilling tax or prohibition outside the United States be instituted as indicated where and when necessary.

▼

Beaty Comments on Amended Kessler Plan

ON the eve of his departure for the Pacific Coast President A. L. Beaty of the American Petroleum Institute was shown a cable summary of the modified Kessler plan, the full text not having arrived until after he left. Judge Beaty declared that the Institute looked with favor upon all efforts to improve conditions in the industry and that Mr. Kessler's supplementary suggestions would receive the fullest consideration. Judge Beaty's feeling was that from a practical point of view the adoption of a plan of this type would involve complete agreement on the subject between all exporters which might not be easy to achieve. To Judge Beaty it appeared logical that the current interest apparent in some quarters for a world-wide agreement would lead to an early international conference on the subject, and it was his view that such a conference—if held—should meet abroad in order to secure a full representation of all interests, including the Russians.

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Production Diagram

IT may be of interest to our readers to know that the diagramatic form of presenting world crude oil production figures as reproduced in WORLD PETROLEUM on page 70 of the February issue was first designed by R. Mercier, assistant to W. P. Haynes, chief geologist in Europe for the Standard Oil Company of New Jersey.

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SEVENTEENTH Annual meeting of the American Association of Petroleum Geologists will be held at the Biltmore Hotel, Oklahoma City, Oklahoma, March 24–26.

Soviet Activity

PLANS are under way to increase the asphalt capacity of the Azneft Oil Trust in Russia from 100,000 tons present capacity to 500,000 tons during 1932 for which purpose several installations are to be erected for the refining of heavy goudron residues for asphalt. The entire asphalt production of the Azneft will be concentrated at the Stalin group of plants situated in the White City suburb of Baku. Along with the asphalt plants, production of benzol and coke will be introduced at the Baku plants. It is planned to export the entire production of 20,000 tons of coke.

Western Kansas—A New Oil Empire

Re-vitalization Has Recently Taken Place, Increasing Potential to 200,000 Bbl. Daily of High Gravity Crude, Making This State of Paramount Importance.

By Basil B. Zavoico

Consulting Geologist and Economist
Tulsa, Okla.

NEW capital has been poured into western Kansas. A total of 1,500 wells drilled to date represents an investment of around $50,000,000 in drilling alone. Oil reserves are estimated at 700,000,000 bbl. plus gas to the equivalent of another 760,000,000 bbl. of crude, and many additional oil fields undoubtedly will be discovered before long. Whole counties have been leased solidly by major operators. Crude pipe lines have been laid down in the eastern part of western Kansas, while natural gas lines tap the opened reservoirs to supply far away industrial centers. A new oil empire is coming into being, making a famous wheat country also a great source of modern fuels.

IN the continuous quest for oil new territories are being opened for production. With the growth of the oil industry and the depletion of older fields, the search for oil widens. One after another the potential oil producing provinces are being eliminated. This is particularly true of the United States where the search for oil has been most exhaustive and where discovery of new reserves is necessary in order to assure the huge petroleum industry of its future supply.

Western Kansas is one of such new territories, a frontier of the oil industry, one of the very few left in the United States, and hence it is of paramount importance, particularly as the crude is of high gravity. The economic value of western Kansas is not questioned any more. Occupying an area of some 55,000 square miles, about 35,000,000 acres, western Kansas has now 64 oil and gas fields. The crude oil reserves of this new province are estimated at 700,000,000 bbl.; while its proven natural gas reserves are estimated at 4,000,000,000,000 cu. ft. or equivalent to 760,000,000 bbl. of oil. Western Kansas can be classified already as an area of very great value, and as an area of even greater prospects.

Since 1889 Kansas has produced about 601,000,000 bbl. of crude oil, of which 30,000,000 bbl. have been derived from its western portion in the last eight years. Definitely established after the El Dorado boom as a State with settled production, Kansas has been re-vitalized in the last three years, until to-day its potential production of about 200,000 bbl. per day is twice as large as at any time since the first discovery of oil in the State in 1889.

Until the end of 1923 western Kansas was practically taboo for wildcat operators, and there was not a single producing oil well in the area; even as late as 1926 there were in this territory but two minor fields, the Fairport and the Welch. Several factors delayed the development of western Kansas. The primary cause, however, was of geological origin. With the gradual westward extension of producing limits of northeastern Oklahoma and eastern Kansas it was found that the Permian, Pennsylvanian and Mississippian formations thicken greatly to the west, and consequently it was thought that the oil producing formations of lower Pennsylvanian and Ordovician would be found at prohibitive depths. Even the discovery of oil in 1923 in the Fairport pool of Russell County, and in 1924 in the Welch pool of Rice County did not alter the situation, because oil in both instances

Churchill pool, north of Oxford, Kansas.
Photo.—Edgar B. Smith

was found above the Mississippian proper, and it was still presumed that the great thickness of Mississippian would prevent commercial Ordovician exploitation to the west.

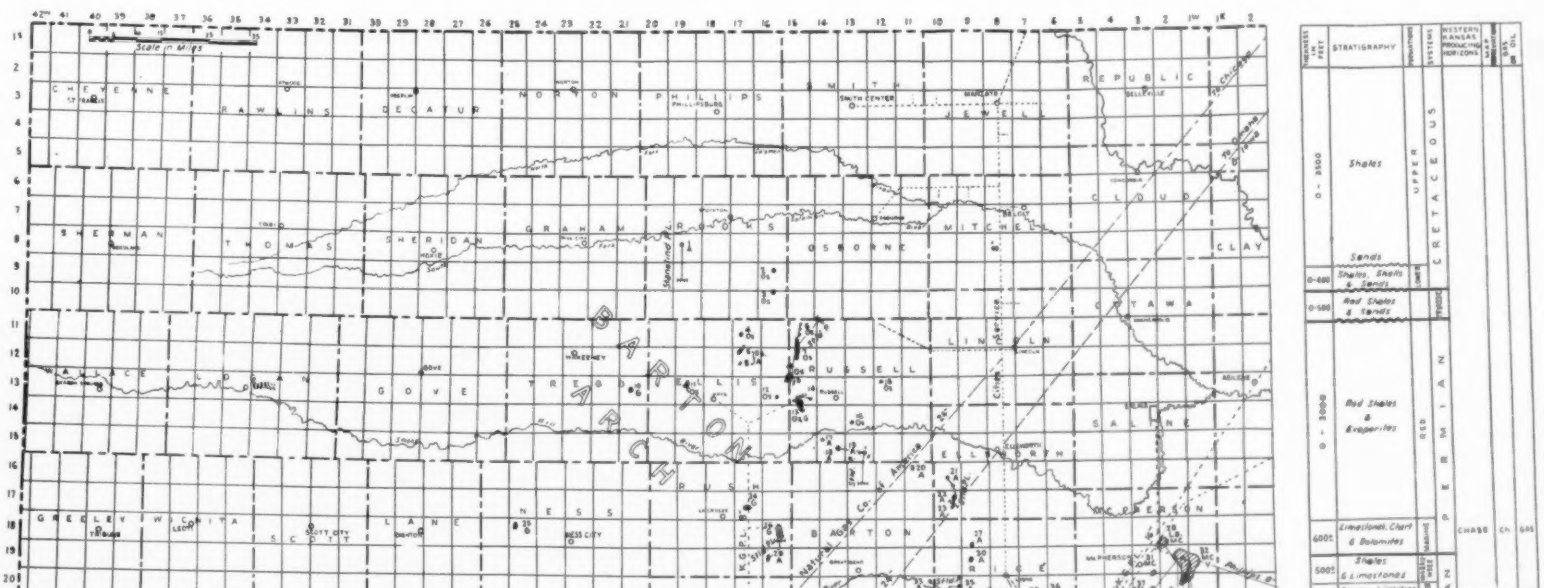
It was not till 1926 that it was authoritatively reported that in Russell County the Pennsylvanian sediments rest directly upon the sediments of the Ordovician or Pre-Cambrian age, and that the Mississippian to Ordovician section is gradually cut out. Also it was discovered that the Pennsylvanian itself does not greatly thicken to the west as was thought originally. These two revolu-

Map and Legend of the Western Kansas Oil Area

Pool	Year of Discovery	Depth of Producing Horizon feet	Production per Well Aver. bbl.	Production per Well Max. bbl.	Number Wells	Estimated Total Initial Production bbl.
1 Silvers	1930	3445	300		1	300
2 Tatkenhorst	1927	3320	250		2	425
3 Kruse	1928	3425	small		1	
4 Hadley	1929	3440	120		1	120
5 Shutts	1928	3300/3650	330	585	8	2,640
6 N Fairport	1929	3170	38		5	192
7 Fairport	1923	3000	157	550	106	16,623
8 Weigle	1929	3500/3700	250		2	500
9 S Fairport	1926	3100	114	200	25	2,859
10 King	1929	4100	20		1	20
11 Johnson	1929	3600	262		4	1,050
12 Reidel	1927	3870	5		1	5
13 Gorham	1926	3100	150	900	37	5,504
14 Dillner	1930	3300	150		2	300
15 Rockefeller	1930	3045	100		1	100
16 Miller	1931	2925	100		1	100
17 Gideon	1930	3320	180		1	180
18 Ochs	1929	3375	265		3	795
19 Sellens	1929	3300	283	800	7	1.980
20 Davidson	1930	3340	200		1	200
21 Stoltenberg	1931	3362	1,700	2,400	2	3,400
22 Stratman	1931	3270	2,400		1	2,400
23 Heiken	1930	3221	2,000		1	2,000
24 La Crosse	1928	3575	13 MGas		1	13 MGas
25 Aldrich	1929	4430	200		1	200
26 Mohr	1930	3500	30 MGas		3	90 MGas
27 Plogg	1930	3252	2,000		1	2,000
28 McPherson	1926	2950	185		6 oil	1,110
			8½ MGas	20 MGas	15 gas	125 MGas
29 Greenwalt	1931	3835	400		1	400
30 Beyers	1931	3240	250		1	250
31 Shell	1932	2980	600		1	600
32 Ritz-Canton-Galva	1929	2950	19¾ MGas	50 MGas	66 gas	1,300 MGas
		2980/3400	1,150	6,800	106 oil	122,669
33 Isern	1931	3328	1,000		1	1,000

Pool	Year of Discovery	Depth of Producing Horizon feet	Production per Well Aver. bbl.	Production per Well Max. bbl.	Number Wells	Estimated Total Initial Production bbl.
34 Schurr	1929	3340	800	2,000	12	9,568
35 Cress	1931	3330	1,200		1	1,200
36 Welch	1924	3400	182	1,000	29	5,268
37 Voshell	1929	3200/3450	895	2,600	99	88,609
38 Richardson	1930	3600	1,000		1	1,000
39 Hollow	1931	3510	500		1	500
40 Palmer	1930	3000	170		2	340
41 Study	1930	3350	130		4 oil	520
			16 MGas	23 MGas	4 gas	64 MGas
42 Haury	1928	3000	175		1 oil	175
			43 MGas		1 gas	43 MGas
43 Gray	1932	4000	small		1	
44 Smith	1927	3550	300		1	300
45 McCarty	1929	4600/4950	520		1 oil	520
			5 MGas		4 gas	20 MGas
46 Tonn	1930	3610	300		1	300
47 Cross	1929	3650	small			
48 Goodrich	1928		Eastern Kansas			
49 Wright	1928		Eastern Kansas			
50 Miles	1931	3340	600		1	600
51 Fleeger	1926	3890	800		1	800
52 Curry	1929	3400	small		1	
53 Eastborough	1929		Eastern Kansas			
54 Robbins	1929		Eastern Kansas			
55 Hugoton	1927	2600–2900	6½ MGas	15 MGas	133 gas	870 MGas
56 Latta	1927	3050	46		9	415
57 Meyers	1926	1950	2 MGas		4	7½ MGas
58 Hitchcock	1926	3500	small		1	
59 Peasel	1930	3700	130		4	515
60 Morisson	1928	5475	20 MGas		1	20 MGas
61 Alexander	1927	4500	23¾ MGas		8	190 MGas
62 Liberal	1922	2740	4½ MGas		2	9 MGas
63 Douglas	1927	4500	429		1	429
64 Williams	1929	4770	1,100		3	3,330

MGas—Millions of Cubic Feet of Gas



Legend— Oil Fields Gas Fields —— Crude Oil Pipe Lines (Dotted lines) Natural Gas Pipe Lines

Eastborough pool in Eastern Kansas.

tionary changes in interpretation of stratigraphy of western Kansas attracted progressively greater attention of wildcatters because these changes reduced the depth of the oil producing horizons from the original estimates of around 5,000 ft., or more, to but 3,000 to 3,500 ft. Thus while prior to 1925 in western Kansas there were drilled but 212 wells, of which 93 were in Fairport and Welch pools, in the following years drilling operations increased very rapidly. In 1926 there were drilled 101 wells in western Kansas, in 1927—96, in 1928—103, in 1929—257, in 1930—433 and in 1931—267.

Summing up the stratigraphic and structural factors affecting western Kansas it may be concluded definitely that a large portion of western Kansas is most favorably situated for discovery of new oil and gas fields at shallow depths. Only one somewhat unfavorable factor exists, which affects all of western Kansas, namely the absence of sand reservoirs, restricting all petroleum accumulations found so far to limestones. This factor alone, however, cannot in any way preclude the possibility of major oil fields in western Kansas. It is only sufficient to point out such prolific limestone fields as the Yates and Winkler in Texas, the Hobbs in New Mexico and even the Ritz-Canton-Galva in western Kansas itself. Similarly the basal conglomerate is responsible for major oil accumulation on the Amarillo Uplift of Texas Panhandle in Gray and Carson Counties.

The crude oil from western Kansas is uniformly of high gravity, ranging from 37 to 50 degs. Beaume, it has a low sulfur content *and its gasolines have high anti-knock rating.*

Ritz-Canton-Galva Field (No. 32)

RITZ-CANTON-GALVA field, located in McPherson County, is very definitely in a major class, yet all its production is derived from limestones only. Oil and gas are encountered at the top of the Mississippian, in the "chat," and oil is found in the Viola dolomitic limestone of Ordovician. A total of 172 producing oil and, or, gas wells has been completed in this field. The drilling so far has been most conservative. Eight to sixteen Viola limestone wells have been completed in each section in the developed portion of the field, or but one well on 80 to 40 acres. Mississippian "chat" wells do not exceed eight to a section, or an average of one well to 80 acres.

A total of about 10,000 acres is indicated as definitely proven for production, and additional extensions are very likely. Shell Petroleum Corporation originally fully owned between 8,000 and 9,000 acres in Ritz-Canton-Galva field. This concern still owns large interests in all these leases, having adopted a sub-leasing policy in this field, retaining an overriding royalty. The relationship of the more important Viola limestone wells, which number 67, is thus but one well to 150 acres, while all wells drilled in the field average one to 58 acres, compared with the standard Mid-continent well spacing of one well to 10 acres.

In 1931 the Ritz-Canton-Galva field produced 3,553,000 bbl., and its total recovery to date has been about 5,400,000 bbl. In 1931 its actual daily production increased from 5,951 bbl. in January to 16,417 bbl. in December. Its potential at this time is 117,000 bbl., with Viola limestone wells being credited with 69,535 bbl. and Mississippian "chat" wells with 37,712 bbl. Allowable, as fixed by the Kansas Public Service Commission, currently averages 13 percent of the potential. Several pipe lines are serving the field.

Typical Kansas rig.

Present natural gas potential of Ritz-Canton-Galva field is estimated at 937,000,000 cu. ft. per day, of which but 25,000,000 to 30,000,000 cu. ft. is being withdrawn, or three percent of the total capacity; Summer withdrawals do not exceed 15,000,000 cu. ft. per day.

Crude oil reserves of the Ritz-Canton-Galva field can be conservatively estimated at 15,000 bbl. to the acre, from both its horizons, thus indicating a very imposing total reserve of 150,000,000 bbl. The recoverable natural gas reserves of the Ritz-Canton-Galva field are roughly estimated at 100,000,000,000 cu. ft., or sufficient for about 15 years at the present rate of withdrawal. The natural gas reserve in the Ritz-Canton-Galva field in the Mississippian "chat" is calculated on the basis of producing zone being 40 ft. in thickness, having 20 percent porosity, an average initial pressure of 975 lb. per sq. in., a recovery of 50 percent and a total area of 7,500 acres.

Voshell Field (No. 37)

AT the close of 1930 the Voshell pool had an estimated potential of 82,000 bbl. per day, due principally to the development of the Arbuckle limestone zone. During 1931 an average of 15,200 bbl. per day has been produced; at the present time the actual daily production of about 10,000 bbl. is the most the field can produce.

Voshell pool is a small, narrow structure, covering around 1,100 acres. A total of 9,725,257 bbl. has been produced from this field till January 1, 1932, of which 5,396,909 bbl. were recovered during 1931. The recovery to date is thus about 9,000 bbl. to the acre, with estimated total recovery of 15,000 bbl. to the acre, indicating a remaining reserve of 6,600,000 bbl.

Barton Arch Fields

THE oldest field in the territory related to the Barton Arch is the Fairport pool (No. 7) discovered in 1923, and

located on a secondary structural feature trending north south and known as the Fairport anticline. The field is producing from the lower Pennsylvanian Oswald limestone encountered at about 3,000 ft. Proven area of the Fairport field is 1,300 acres, and its total production to date has been 7,271,835 bbl., or 5,600 bbl. per acre. The cumulative recovery is estimated at 6,500 bbl. per acre, thus giving the field a future recovery of some 1,200,000 bbl.

The Fairport pool and its per acre recovery can be considered as typical of the Pennsylvanian limestone production to be encountered in this general province. About ten additional pools have been discovered in the area immediately contiguous to the Fairport field, all producing from the Oswald limestone, but none so far giving indications of duplicating the Fairport either in area or in recoveries.

The northeastern, eastern and southeastern rim of the Barton Arch has furnished the most spectacular development of western Kansas in the last two years. In a crescent shaped line, 80 miles in length, roughly following the outline of the Arch, from south Russell County, through Barton, Ellsworth, Rice and into Stafford County, have been found 13 oil producing localities, some of which undoubtedly will be connected. Most of these fields have but one well each.

Crude of very high gravity (45 deg. Beaume and above) and of low sulfur content, is found at from 3,300 to 3,400 ft. in the Arbuckle dolomitic limestone of the Cambro-Ordovician age. Initial production of wells ranges as high as 2,400 bbl. per day. Very little natural gas accompanies the oil, usually in insufficient volume for sustained flow; but the wells respond excellently to pumping, in one instance reporting 2,423 bbl. per 24 hours.

Total potential of the whole crescent shaped area, the "Ellsworth Arch," is about 25,000 bbl. per day. Only one field, the Schurr (No. 34), has been developed to any extent, having 12 wells with a pumping potential of about 9,000 bbl., and an allowable of 20 percent. Schurr field has produced to date 265,000 bbl., having been shut in most of the past year. The Schurr field is the only field of the Barton Arch province which is served by a trunk pipe line (Prairie Pipe Line Company*), other pools either being unconnected at all or served by short pipe lines of the Stanolind Crude Oil Purchasing Company, connecting with railroad loading racks.

It is evident that no definite conclusions can be drawn at this early stage of the Arbuckle limestone development on the Barton Arch. Indications are that fields of the "Ellsworth Arch" will be narrow and limited in area, though their cumulative area will undoubtedly prove to be very considerable. In its present limited extent, from Russell to Stafford County, a conservative estimate would be for 5,000 acres to be proven for production, probably much more, and at 10,000 bbl. per acre recovery a reserve of some 50,000,000 bbl. is indicated.

Oil and gas have been found on the Barton Arch proper, in Rush County, but the development of both has been so limited that no conclusions can yet be reached as to their potentialities. The size of oil wells is sufficient to presume very considerable prospects; the gas producing horizon, the basal conglomerate, is an entirely unknown zone in this area, as far as its reserves are concerned, and moreover the two producing gas fields have not been at all defined, though it is presumed they will be small in area. The Greenwalt pool (No. 29) has been shut in ever since discovery, and consequently the Arbuckle limestone possibilities of this portion of the Arch are even less known than those of the "Ellsworth Arch."

Geologically western Kansas may be divided into three provinces:‡

(1) "A relatively small area comprising the northeastern and east-central part of western Kansas wherein a considerable thickness of Mississippian and Siluro-Devonian sediments separate the Pennsylvanian from the Ordovician."

Structurally this province is influenced principally by the Nemaha Granite Ridge, the major positive buried structural feature of the north Mid-Continent, which trends about N 18 deg. E crossing the State of Kansas from Nemaha to Sumner Counties. On this Ridge the granite is buried under 550 ft. of sediments in Nemaha County, dipping rapidly southward, until it is found about 6,000 ft. below the surface in Sumner County. The local anticlinal trends and individual highs in general parallel Granite Ridge and can be interpreted as the foothills of the Ridge. The negative feature, roughly due north from McPherson County, is known as the Salina basin. This basin has been inadequately prospected so far and finding of secondary positive structures within it is very probable.

"In this area have been developed major oil and gas fields in the Mississippian Chert, 'chat,' and in the Ordovician sands and limestones, Simpson and Viola. The Ritz-Canton-Galva, the Voshell and the McPherson are the three principal pools of this province. Additional major fields in this area may be discovered. Producing horizons are encountered from 3,000 to 3,500 ft. and consist to some extent of sands (Simpson), though principal production is derived from the limestones and cherts (Mississippian and Viola). New fields which may be discovered due north from McPherson County will be progressively deeper, though still within easy and inexpensive reach of the drill.

(2) "An area of considerable extent lying, in general, south of Arkansas River from Range 1 West to Range 43 West, inclusive, but probably extending an undetermined distance north of the river west of Edwards County, wherein both thick and thin Mississippian but thin, or totally absent, Siluro-Devonian sediments separate Pennsylvanian from Ordovician. Here the Ordovician post-Arbuckle sediments are relatively thin."

Structural features of this province are still but little known. In general the sediments dip westward from Sumner to Clark County, and eastward from Morton to Clark County, forming a synclinal basin which is referred to as the Dodge City basin. This basin trends northwest southeast, extending from Comanche and Clark Counties an undetermined distance northwest, tentatively through Ford, Scott and Logan Counties. Isolated, and apparently unrelated highs of minor importance occur in several localities. In the extreme southwest corner of the State, in Stevens County, a very gentle terracing has been found which, in combination with pinching out of porous dolomitic limestones to the west, has been sufficient to create a huge natural gas reservoir in lower Permian marine sediments. This province (2) has been but little prospected to date, because of the great depth to the oil bearing formations, the Mississippian alone exceeding 1,000 ft. in thickness in Clark County, thus placing the Ordovician at below 6,000 ft. There are no large oil or gas pools in this province, with the exception of the already mentioned Hugoton field in Stevens County, where natural gas is found at from 2,600 to 2,900 ft. New discoveries in this province are not probable in the near future, because of the expensive drilling operations and because of generally negative results so far.

(3) "A vast area, comprising all of north-central-western Kansas, together with an undetermined extent of northwestern-western Kansas, wherein Pennsylvanian strata rests directly upon the sediments of Ordovician or Pre-Cambrian."

The major structural feature of this province is the broad buried Barton Arch, which extends from Rice and Stafford Counties in northwesterly direction through Barton and Norton Counties, possibly connecting with the Black Hills of South Dakota. The Barton Arch closely parallels other major features of the Mid-continent, in particular the Amarillo Uplift of Texas Panhandle, some 300 miles due southwest. In this province are also found secondary anticlinal features, trending northeast southwest, such as Fairport and Stockton anticlines, which are possibly related to the Nemaha Granite Ridge. The Barton Arch and minor warpings on its northeastern rim are the known positive features of the third western Kansas province, but in the remaining area of this vast territory, almost entirely untested by the drill, there may very well be found other major and secondary anticlinal trends and, or, terraces, which will favor commercial accumulations of oil and gas.

As indicated above the great importance of this province is due to the Pennsylvanian overlap of older sediments, truncating progressively the basal Pennsylvanian, Mississippian, Siluro-Devonian, Ordovician and Pre-Cambrian formations, and accordingly reducing greatly the depth of the oil-bearing horizons which are found at about 3,300 ft. on the northeastern and eastern rim of the Barton Arch in Stafford, Rice, Barton and Ellsworth Counties, this rim being locally referred to as the "Ellsworth Arch."

This province has so far produced but little oil due to slow development and lack of trans-

(Continued on page 138)

*Commonwealth Pipe Line Company.

‡Subdivision after L. W. Kesler, A.I.M.M.E., Petroleum Development and Technology, 1927; p. 592.

Iraq Situation Interests European Trade

Granting of Concession to B.O.D. Anticipated —Company Has Strong Continental Affiliations— British Marketing Situation Still Unsettled— Trade Waits on Gasoline Price Agreement.

LONDON

NEGOTIATIONS for a grant to the B.O.D. Company, Limited (British Oil Development) of a concession for the exploitation of oil lands on the western side of the Tigris in Iraq, are reported to have advanced to a point where the conclusion of an agreement may be expected shortly. While it has been anticipated for some time by those who follow the trade situation in the Near East that the B.O.D. would obtain the grant which it has been seeking so persistently, the matter has a special interest for members of the petroleum industry. Taken in connection with the activity which the Iraq Petroleum Company is showing in the development of its holdings in eastern Iraq it is felt that it may bring about important changes within the next few years in the European oil trade.

Back of the recent occurrences in this situation lies an interesting story of international business and politics some chapters of which remain to be told. The moving spirit in the B.O.D. has been F. W. Rickett, who has devoted several years to the enterprise and has brought it to its present stage in the face of many discouraging obstacles. Part of the company's success in getting to its present position probably has been due to strong connections established abroad with Italian, French, and German interests, but it has not been lacking in influential friends at home as is indicated by the list of names comprising its directorate. It appears to have had at least the sympathetic interest of Lord Cowdray as well as of Lord Inverforth and other shipping men.

B.O.D. efforts to interest the League of Nations in its case have been detailed rather fully during the past three years. Apparently the outcome of the unsuccessful assaults made on the Iraq Petroleum Company's claims was to leave the latter dominating the situation completely. For reasons which may be surmised, though they have not been definitely stated, the I.P.C. decided, however, that it did not wish to appear as a grasping monopolist and resigned its claims to oil deposits west of the Tigris on confirmation of its exclusive privilege to work the territory east of the river from the Persian boundary southward. This has opened the door to the western territory in such a way that the B.O.D. could hardly decline to enter. Iraq Petroleum professes to be well pleased at the prospect that another company will engage in oil prospecting in an adjoining district, but has not indicated whether or not it will be willing to handle B.O.D. oil through its pipe lines on reasonable terms.

EXPECTED early confirmation of an oil exploitation concession to the British Oil Development Company by the Government of Iraq has directed fresh attention on the part of the European trade to this Near Eastern field. Viewed in connection with the steps now being taken by Iraq Petroleum to make its present and possible future supplies available to the world market it is held that important changes in the European marketing situation may be brought about within the next few years. Important Continental interests are also represented in the company and the development of new sources of supply fits the policy of their Governments who desire to obtain crude for refining within their own borders.

Among the present directors of the B.O.D. three, A. Giaratana, A. Petretti and Com. V. Amoretti, are directors of the important Azienda Generale Italiani Petroli (A.G.I.P.), the Italian company controlling the Raffineria di Olie Minerali S. A. and other Italian refining companies in which company the Italian Government is interested. Messrs. Giaratana and Petretti in fact are President and Vice President, respectively, of the A.G.I.P. Other European capitalists represented on the board are Krupps, the Swiss Banking Corporation and the group of M. Paul Girod of Paris.

Sir Edward Mountain, Bart., chairman of the board of the B.O.D. is chairman of the Eagle, Star and British Dominions Insurance group which has made a remarkably successful financial record in the past few years. Sir Edward Manville, of the B.O.D. directorate is chairman of the Phoenix Oil and Transport Company and a director of the Sealand Petroleum Company, the European marketing agency of the Continental Oil Company of Delaware. W. R. Brown, another director, is a member of the board of the British Union Oil Company, a private company formed in 1914 to acquire a stock interest in the Union Oil Company of California, and with holdings also in Standard of Indiana. Another of the board is E. C. Simmons, a partner in an important firm of London lawyers.

The willingness of Continental interests to cooperate in the plans of the B.O.D. probably is the outcome of the policy of the European powers to obtain oil supplies from sources outside of America, oil too that will be shipped for the most part as crude to be refined in the countries requiring the product.

Participation of these interests may be taken as an added assurance that the announced policy of the company to begin development without delay is to be accepted literally. While the terms of the concession have not been published it is assumed in trade circles that they are similar to the one previously granted to

the Iraq Petroleum Company, that the concession runs for seventy-five years and involves payment of a yearly rental in sterling with a royalty on the oil produced.

It is estimated that the area which the company will be allowed to take over for exploitation comprises altogether nearly 200 square miles and it is believed by those acquainted with the situation that the first development will be undertaken in the region south and west of Mosul. In the matter of transportation it is probable that the company's decision will depend upon the possibility of obtaining reasonable tariffs and adequate facilities for the use of the lines projected from Kirkuk to Tripoli and Haifa. If not the company will be faced by the necessity of constructing a line of its own, an undertaking that would involve the expenditure of probably some £7,000,000.

The positional advantage of the Iraq field in regard to shipments to Italy, France and Spain, and, in lesser degree to Germany, are apparent. Not only are the distances of ocean transport less but the necessity of passing through narrow channels that might be made impassable in time of war is eliminated. Neither American, East Indian, Persian nor Russian production can be sure of access to the Mediterranean in time of war, but that of Iraq can. Support of the new enterprise, therefore, would appear to be of particular importance to Italy, France and contiguous countries.

No visible improvement has taken place in the condition of the British oil trade since the turn of the year. In fact there appears to be a greater lack than before of the spirit essential to the composition of existing differences and the stabilization of marketing operations on a profitable basis. There are rumors that the Soviet interests have rejected a suggestion that their total importation for the year be placed at 500,000 tons (40,000,000 bbl.) and that a similar deadlock has occurred with the Petroleum Storage and Finance Corporation, which is demanding an allowance very much larger than its 1931 distribution based on the rapid growth of its business. This company, however, has increased the price of its motor spirit regardless of the 2-cent "loyalty rebate" allowed by its competitors which indicates a serious desire to arrive at a stable and satisfactory marketing price.

In other directions, too, the future of the British petroleum trade is obscure. It is not expected that oil will be left under the provisions of the 10 percent ad valorem tax recently announced, but that it will be made the subject of a special order. There seems to be some expectation that certain advantages will be conferred on companies that can qualify as being purely British in composition though the Government has given no indication of an intention to adopt such a policy. The general belief is that when a special order is issued it will be so framed as to encourage the establishment of more refineries. This would seem to point to a moderate duty on crude and a higher if not prohibitive impost on refined. Presumably a reasonable time would be allowed for existing concerns to establish or increase their refining facilities.

At present the Dutch-Shell and Anglo-Persian groups do more refining in Great Britain than any of their competitors,

HAS ETHYL IMPROVED HILL-CLIMBING?
HAS IT IMPROVED ACCELERATION?
HAS IT PREVENTED PINKING?
Almost to vanishing point
YES
YES
YES
says the DAILY MAIL
"Acceleration was cleaner and more rapid, and more power generally was available." THE TIMES
"The engine delivers more power, particularly on hills, and is more flexible." AUTOCAR
"Practically eliminates knocking or pinking . . . Gear changing is less frequently necessary." SUNDAY TIMES
Pratts
ETHYL
is now REDUCED
to same price as
regular petrols
The ORIGINAL Anti-Knock Fuel

Reproduction of an advertisement of the Anglo-American Oil Company, illustrating how the Company is meeting increased competition.

and they are reported to be planning important extensions of their facilities. Anglo-American, Cory Bros., and Medway Oil and Storage Company possess refineries, but thus far Petroleum Storage and Finance has confined itself to distribution, and to finding a market for the products of the big refinery of the Pan American on the island of Aruba in the Caribbean. If the Government attempts to favor home and Empire undertakings it is probable that Trinidad Leaseholds, as a simon-pure British enterprise, would be allowed to bring in refined spirit on preferred terms but difficulty is certain to arise in the attempt at a classification of other companies, including some of the largest.

The opinion in well-informed financial circles regarding the position of oil companies and the prospects for shareholders is indicated by a circular of Rowe and Pitman, one of the leading stock-broking firms of the City. In their monthly report issued at the end of January they say in part:

"It cannot be said that the outlook for gasoline consumption is promising while the Governments of Great Britain, Germany and France persist in their severe deflationary policies; but, for the oil industry as a whole, everything depends upon a recovery of trade in America which accounts for 65 percent of the world's oil consumption. The beginnings of an inflationary movement in America would be quickly reflected in higher gasoline prices.

"We already have pointed out that oil profits this year will be evanescent if companies write down their stocks to current market values. Whether the Royal Dutch, Shell Transport, Anglo-Persian and Burmah oil companies will pay final dividends depends largely on the trend of consumption in the next few months. The interim dividends have been passed by all of these except Burmah Oil and we think shareholders will be fortunate if they receive final dividends at the reduced rates of last year. . . . Shareholders must expect lower prices for oil shares while the world trade depression lasts and uncertainty about the final dividends persist, but we suggest, in view of the economies and the closer working arrangements being effected, that the opportunity should be taken of acquiring the leading equity shares whenever the price drops to about 50 percent above par."

▼

The S.A.E.M. Pechelbronn recently obtained a permit to drill for oil in Alsatia, France, which covers an area of 15 square km's. 95 hectares, situated in the communes of Strasburg-Campagne, Wahlenheim, Wittersheim and Haguenau. The permit covers a period of two years and drilling operations must be commenced not later than three months after the delivery of the permit.

▼

Ways and Means Committee of the U. S. House of Representatives has reported a revenue bill imposing an excise tax of four cents per gallon on all lubricating oil and a tax of one cent per gallon on imported gasoline, gas oil, fuel oil and crude oil.

Crude Storage Has Cost Companies $1,500,000,000 Since 1918

The Day of Settlement Approaches for an Industry that Maintained Prices by Purchasing Crude for Storage and Speculation.

By John A. Moffitt

In the World War the British Navy was reported to have floated to victory on a sea of oil. During the post-war period a sea of oil has been created by the American oil companies, but this is more likely to bring them defeat than victory. Partly as a measure of conservation, partly as a speculation in the price of oil, but mostly to support the then current price of crude, the American oil companies have poured over $500,000,000 into purchasing oil for storage and yet the value of the oil held above ground today is less than it was in 1918. In other words, this half billion dollars stands as an inventory loss which constitutes a threat to the financial stability of the industry while the oil itself, which represents more than a six months' supply for our refineries, stands as a barrier to any large increase in oil prices.

At the end of December, 1918, just after the close of the War, there were some 95,000,000 bbl. of crude stored in tank farms and pipe lines east of California. There was an additional 14,000,000 bbl. in refineries. Producers' crude stock amounted to 2,000,000 bbl., while in California there was a total of slightly over 28,000,000 bbl. in pipe lines, tank farms, and refinery stocks of crude. Altogether this amounted to 139,500,000 bbl. of oil in storage, which was, of course, of many different grades and produced by many different fields. For this reason it would be extremely difficult to obtain an absolutely accurate figure for the value of the oil in storage. As most of this oil was mid-continental and as there is an excellent series of prices for Kansas–Oklahoma crude oil of 33–33.9 degree gravity, it is assumed in the computations that follow that the average value of all the oil in storage would be the equivalent of the price of this grade. As this oil was selling in December, 1918, at $2.50 a barrel, the estimated value of stored oil at that time amounted to $348,700,000.

Another difficulty which arises in making these estimates is the fact that at least twice, during the post-war period, changes were made in the method of computing the amount of stocks on hand. These changes, however, tend to offset each other and in the accompanying table an attempt has been made to present a continuing series which closely approximates the actual amount of oil in storage on each of these dates.

During only three of the 13 post-war years (1926, 1930, 1931) was more oil removed from storage than was put in. In the other 10 years large quantities were added to the stocks already carried. The years of 1922, 1923, and 1927 saw the largest annual increases in existing storage. These years were also ones in which the price of oil showed a sharp reduction and production a sharp expansion. It was at such times as these that the three causes for storage—conservation, speculation, and price support—made their greatest appeal to the operators.

In 1922 there was a large increase in production in Oklahoma and prices broke from $2.25 in June to $1.25 in August. In 1923 the output of California oil was nearly doubled and prices again fell sharply from $1.83 in April to $1.02 in December. In 1927 there was an increase of nearly 100,000 bbl. in Oklahoma and an additional gain of about half that amount in Texas. This again caused a sharp fall in prices from $1.70 earlier in the year to $1.12 in April. Under these conditions conservation demanded storage of the oil taken from the flush fields. At the same time many companies, feeling that there would be a recovery in price as soon as the flush output was over, purchased this oil for speculation. Such speculative purchases, by withholding the oil from the market, led naturally to a firming of the price of crude, thereby allowing a greater profit to be made by those who had producing wells. It was felt at this time that there was a distinct limit to the amount of oil available in the United States and that with the natural increase in consumption we would shortly exhaust our supply. Had this been true and had the new fields in the Mid-continent, Gulf Coast, and California districts not been discovered, such speculations would not only have been profitable to the holders of the oil, but they also would have been of value in keeping the industry supplied with a sufficient quantity of crude.

One point, however, generally overlooked, was that, because of the support given to the price of oil by these purchases, the search for new sources of oil was stimulated and discoveries made to an extent that would have been considered unbelievable 10 years ago. If, on the other hand, prices had been allowed to decrease through an absence of speculative purchases, the price of oil would have probably declined sufficiently to make an intensive search for new oil unprofitable. These wells would have eventually been discovered, but the delay would have been sufficient to have prevented them from throwing their output upon a saturated market, and forcing prices to their present low level.

In fact, it has been the abandonment of the storage principle and the enforcement

Crude Inventories in Relation to Funded Debt

Name	Oil Inventory Thousands of Dollars 1928	1929	1930	1931	Storage Capacity—Thousands of bbl.	12/31/30 Funded Debt Thousands of Dollars	Times Interest Earned 1928	1929	1930
Standard Oil (N. J.)	233,822	269,236	282,729*		55,581[1]	169,041	15.75	16.95	7.39
Standard Oil of Indiana	50,588	49,034	138,616*		.....	57,879	.....	.....	11.5
Standard Oil of New York	147,209	157,497	136,707		.....	98,321	8.99	9.56	4.61
The Texas Corp.	116,073	135,850	123,431		99,752	116,000	24.58	18.08	3.24
Standard Oil of California	48,575	52,228	55,125	[2]	89,189	.....[2]	.....	.....	.....
Consolidated	.....	.....	.....	60,503*	.....	65,056	.....	.....	.....
Shell Union	32,478	47,636	47,471		28,000	125,507	5.95	4.69	.23
Union Oil	26,666	41,209	38,066		40,660	32,234	10.21	14.34	6.89
Gulf	63,829	82,179	6,502		.....	125,404	11.19	13.04	2.99
Tide Water Associated	29,213	40,949	38,588	36,676[2]	38,496	12,500	14.13	15.14	10.77
			927,766			801,942			

* Includes other inventories in addition to oil. [1] Actual crude stock 1930. [2] May 31, 1931.

of State conservation measures, combined with the low prices, that has reduced the crude output to a point where it is now below even our reduced consumption. This has made for a draft upon our stocks on hand and a very considerable increase in price above the disastrous levels of last summer. Until the State conservation measures were enforced in 1930, 1926 was the only year during which stocks were reduced. That year saw a very small increase in total production, the gain being less than one percent. California showed an absolute decrease in output but this was offset by slight gains in Texas and Oklahoma. Prices during the year were strong and holders of speculative oil were able to dispose of part of their stock on a profitable basis. Prices during 1930 and 1931, however, have been weak and though the oil in storage was reduced, such sales would have shown the holders a loss.

Although the loss in holding refined oil has not been included in the computation, it is interesting to see that the stock of refined oil has also shown a sizable increase, rising from 47,800,000 bbl. at the end of 1918 to 153,400,000 bbl. in November, 1931. On a percentage basis this increase is just as rapid as the increase of crude in storage. The quantity involved is only approximately one-third as large. The fluctuations in the stocks on hand have also been smaller when the seasonal influence is eliminated. The rise to 1924 and 1929 was less rapid than in the case of crude and the only declines occurred in 1924 and in 1931. Due to the decline in gasoline, fuel oil and other refined prices, the speculative loss which was incurred in the holding of these finished oils must also have caused a very considerable drain upon the various oil companies.

In addition to the speculative losses incurred through the fall in the price of oil carried in storage, there is a constant cost due to fixed charges and losses by evaporation. A large-size steel tank costs approximately 40 cents per barrel of storage capacity. In addition, foundations are required which usually run between 60 and 70 percent of the cost of the tank itself. There is depreciation and upkeep on the tank as well as insurance or fire losses upon the oil. The loss through evaporation depends partly upon the amount of volatile materials contained in the oil and partly on the type of storage tank used. Evaporation also tends to decrease the longer oil is held in storage. This loss may run anywhere from half of one percent to two percent in volume; but the dollar loss is even greater, since the fractions which evaporate are the most valuable constituents of the oil. The all-in cost of storage for one barrel of crude oil per year was estimated as being 20 cents in 1930. With the decline in the price of oil since that period, this figure has undoubtedly become somewhat lower. Through the entire post-war period, however, the price of oil was considerably above that of 1930 and 20 cents, therefore, is probably a conservative estimate of the storage charge. Using this figure as a basis, and multiplying it by the 5,069,100,000 bbl. of oil which were stored for one year, it will be seen that the cost of carrying this oil in storage since 1918 has amounted to slightly more than $1,000,000,000, a sum that should be added to the speculative losses. These items are carried in the statement below, and it will be seen that the total loss accruing to the oil companies has amounted to $1,614,300,000.

Inventory Losses Since 1918

	Millions of dollars
Value of crude oil in storage—December 31, 1918	348.7
Cost of oil added to storage—1919-1931 incl.	571.3
	920.0
Value of crude oil in storage—December, 1931	319.5
Shrinkage in value	600.5
Cost of carrying oil (5,069,100,000 bbl. yrs. @ 20¢ per yr.)	1013.8
Total Loss	1614.3

It would be exceedingly difficult to attempt to apportion the loss between the various individual American oil companies. One method of approach available, however, is by means of their reported storage capacities. The United States Bureau of Mines made a survey of the total tankage capacities of this country in 1926 and at that time reported that storage facilities for both crude and refined oils amounted to 815,994,000 bbl. This was in addition to the pipe line capacity of 15,000,000 bbl., which is, in effect, a permanent storage for that volume of oil. There undoubtedly has been an increase in storage capacity since 1926 as the volume of oil in storage has increased so rapidly since that time. The largest amount of crude and refined oils reported in storage, however, occurred in the month of May, 1930, when 700,800,000 bbl. were listed by the Bureau of Mines. Of this total 533,700,000 bbl. were crude and 166,200,000 bbl. were refined.

The figures of oil inventories and, wherever available, storage capacity of 10 of the larger American companies are shown in the table on page 112. A rough estimate of the capacities of those companies where definitive figures are not given, would indicate that the total capacity for these 10 companies amounts to approximately 700,000,000 or seven-eighths of the U. S. capacity in 1926. Although these figures include both crude and refined oil, it seems evident that by far the largest amount of crude oil in storage in this country is owned by these 10 companies. The storage capacity of the Standard Oil Company (N. J.) is apparently not available, but at the end of 1930 it reported that it had 55,581,000 bbl. of crude oil actually in storage. At that time its inventories, including other than oil, amounted to $282,729,000, a far larger sum than any reported by the other companies. Standard Oil Company of Indiana, which at the end of 1930 reported a total inventory of $138,616,000, did not give figures either on capacity or the volume of actual oil in storage. The inventory figure, however, would indicate that they stand at or very close to second place in this connection. This estimate is strengthened by the fact that in 1930 the company, which formerly owned a 50 percent interest in Sinclair Crude Oil Purchasing Company and Sinclair Pipe Line Company acquired the remaining 50 percent interest from Sinclair Consolidated Oil Corporation. As these two companies owned 35,722,000 bbl. of crude oil at the end of 1930, this purchase added that amount of oil to Stanolind's inventory and probably accounts for the sharp increase in the value of this inventory between 1929 and 1930. The size of the inventory figures reported by the

Quantity and Value of Crude in Storage 1918–1931

Year	Crude Oil in Storage End of Year Millions of bbl.	Change Millions of bbl.	Average Value Kan.-Okla. Crude	Total Value of New Crude Stored Millions of Dollars
1918	139.5			
1919	146.5	7.0	2.50	17.5
1920	166.0	19.5	3.40	66.3
1921	215.6	49.6	1.70	84.3
1922	292.0	76.4	1.81	138.3
1923	379.4	87.4	1.44	125.9
1924	417.6	38.2	1.45	55.4
1925	428.8	11.2	1.68	18.8
1926	403.3	−25.5	1.89	−48.2
1927	473.4	70.1	1.29	90.4
1928	490.8	17.4	1.20	20.9
1929	540.9	50.1	1.23	61.6
1930	512.2	−28.7	1.11	−31.9
1931 (Nov.)	463.1	−49.1	.57	−28.0
	5069.1	+323.6		+571.3

Standard Oil of New York suggests that the amount of oil carried by this company very closely approximates that of the Standard of Indiana. The inventory, however, has shown a reduction rather than an increase since 1929. The Texas Corporation reported that they had a storage capacity of 99,752,000 bbl. This, together with the size of their inventory figure, would seem to qualify them for fourth place.

The relationship between the 89,189,000 bbl. capacity reported by the Standard Oil of California and its inventory figure of $55,125,000 would indicate that this company has been exceedingly conservative in valuing the stock of oil carried on hand even though, as is probably the case, this stock contains a higher percentage of crude than is the case with certain other of the companies listed. The Consolidated Oil Company, which was recently formed to bring together Sinclair Consolidated, Prairie Pipe Line, and Prairie Oil and Gas, probably will stand next with regard to storage facilities. This company has not reported either its capacity or its amount of oil in storage, but its inventory, which was given as $60,503,000, would indicate that its stocks of oil and, therefore, its capacity is quite large. Shell Union has a reported storage capacity of 28,000,000 bbl., but its oil inventory figures stand rather high at $47,471,000. Union Oil Company of California has a capacity of 40,600,000 bbl. and an actual stock of 34,000,000 bbl. of crude and finished oil. These were carried in their inventory and at the end of 1930 at an average price of $1.12 per barrel. Gulf Oil Company reduced its inventories of oil very sharply in 1930. At the end of 1929 it reported an inventory of $82,179,000, but in 1930 this figure was only $6,502,000. Late in 1931 an official of the company, in explaining the Corporation's recent action of omitting the quarterly dividend of 37½ cents, stated that Gulf is using its cash to purchase oil properties at "bargain prices." Whether or not this includes crude oil is, of course, not as yet known; but presumably the storage capacity of Gulf will be increased by these purchases and should add considerably to the total of the list. Tidewater Associated has a capacity of 29,521,000 bbl. of crude and 8,875,000 bbl. of refined. Their oil inventory amounted to $36,676,000 at the end of May, 1931.

All of these companies, with the sole exception of Standard Oil of California, have a funded debt and the sum of these debts amounts to $801,942,000. The sum of their inventories at the end of 1930, including that of Consolidated Oil on May 31, 1931, amounted to $927,766,000. The decline in oil prices that has occurred since that time, together with the reduction in the amount of oil in storage, would undoubtedly reduce the value of these inventories below the amount of the funded debts. It is, of course, not possible to state, except perhaps in one or two instances, that the money obtained by the issuance of these bonds was used to purchase oil to place in storage. The funds did, however, make more money available for the purchase of oil or to reimburse the treasury of the companies for previous expenditures so made. It is interesting to note that in the case of most of the larger companies the inventories greatly exceed the amount of funded debt, while in the case of the smaller companies the tendency is for the opposite to be true.

These oil company bonds were formerly entitled to a very high rating, even though they were mostly debentures, since their interest requirements were covered by earnings many times over. During the prosperous days of 1927, 1928, and 1929, it was not unusual to see interest on these bonds earned from 10 to 20 times. The 1930 interest charges, however, were covered by a much slimmer margin and the reports thus far available for 1931 indicate that this condition is steadily becoming worse, at least three of the companies on the list showing deficits before interest payments. Similarly the equities which lay behind these bonds have been, in the past, extremely high. Even after the stock market crash of 1929 had removed a large part of the value of the equity securities, the New York Stock Exchange reported, on April 1, 1930, that the equity value of listed petroleum shares was very close to eight times the value of the bonds outstanding. On January 1, 1932, however, a similar computation shows that the present value of the equity securities is but 3.4 times the present value of their funded debt, or but 2.5 times the par value of this debt. It is, perhaps, fortunate for the companies involved that most of the debt is in the form of debentures rather than in the form of mortgages and that there are so few issues maturing during 1932 and 1933. Were this not true, the difficulties in which the industry is finding itself today would be very much increased.

The oil companies have passed through an extremely profitable period since the close of the World War. Part of this profit has accrued to them because of the fact that crude oil prices were strengthened through the running of surplus crude oil into storage. The time has now come when they will have to take the loss on this stored crude and when they will have to operate without the stimulus of inflated prices. Production facilities at the present time are very much greater than are warranted by the demand and even if imports of oil are curtailed through tariffs, it seems inevitable that it will be necessary to eliminate a portion of our production by means of receiverships. The fall in commodity prices has increased the burden of the funded debt now outstanding and it will be extremely difficult to pay this off or to transform it into equities with securities markets in their present condition. There is no doubt but that the stronger companies will weather the storm, but even here earnings will suffer because of the earlier storage excesses. These very losses, however, should teach the industry the need of keeping oil under ground until it is actually required. The absence of a market for oil for storage will be a greater aid to conservation than will State laws or State militia.

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Gasoline Consumption, 1932

INCREASING taxation and fewer automobile registrations are factors that probably cause a drop in gasoline consumption in the United States during 1932, is the view of THE LAMP, published by the Standard Oil Company of New Jersey.

"Under the circumstances (and with the hope that subsequent events may prove this estimate entirely wrong), it appears that the petroleum industry may expect a decrease of at least 3 percent in gasoline sales in 1932. If this figure is borne out it will mean total consumption of 435,671,000 bbl. Of this quantity, approximately 20,881,000 bbl. should be taken from the present excess storage; 12,245,000 bbl. would be supplied through imports; 35,750,000 bbl. from casinghead plants; and 1,683,000 bbl. displaced by benzol. The industry would be called upon, therefore, to produce 365,112,000 bbl. of gasoline by "straight run" and cracking. Allowing for importation of only 110,000 bbl. of crude per day, which is the amount imported last year, the domestic producer would be called upon for approximately 2,185,000 bbl. per day averaged throughout the year. The current average daily production at this writing is 2,110,000 bbl. This permits of a draft on crude oil stocks of only 75,000 bbl. per day."

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S. B. SLUTZKY who was representative of the Soviet Napthasyndicate in New York in 1928 has been recently appointed Vice Chairman of the Azneft oil trust at Baku.

International News and Reports

It is possible that the Spanish Oil Monopoly will be dissolved during the current year by the present Government.

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Most of the crude oil imported into Great Britain last year came from Persia, which country was responsible for 9,680,-054 bbl. of the total of 13,170,514 bbl.

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In the middle of February another shipment of Roumanian gasoline for the United States, consisting of 68,000 bbl. crated, was put aboard the tanker RAILA by the Colombia Company.

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Following the formation of a Russian Naphtha Syndicate to handle the sales of Soviet petroleum products in Australia, domestic oil traders have organized and requested the Commonwealth Government to place an embargo on all Russian petroleum products.

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Additional units are to be added to the refinery of the United British Refineries, Ltd., at Point Fortin, Trinidad, a subsidiary of the United British Oil Fields of Trinidad, which is part of the Royal Dutch-Shell group. The present plant is modern, and has a capacity of 5,000 bbl. per day.

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An oil producing well was drilled on the banks of Black Creek in the heart of Lambtonbush, Canada, in 1857, or two years before the famous Drake well in Titusville, Pa. Many other wells followed and the village of Oil Springs came into being as a result of the boom which arose at that time.

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A bill now before the Latvian Parliament, and promoted by the Ministry of Finance, will give—if passed—the Government a monopoly of the imports of gasoline and kerosene which amount to about 50,000 bbl. and 130,000 bbl. respectively. The imports at present are handled principally by the Shell and Soviet organizations.

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On January 11, E. A. Radford, chairman of the Petroleum Storage and Finance Corporation (Indiana Standard) of London, expressed the opinion before his stockholders that there was no justification for the "cuts" of 4d per gallon of petrol from March, 1931, in Great Britain, and that his company was prepared to cooperate in raising the price to a reasonable level. The price now in force represents a total of £16,000,000 per annum reduction in the amount that otherwise would be received by oil companies operating in that country.

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Inter-Continent Petroleum Company of New York, which holds concessions of 1,700,000 acres in Turkey, are about to drill a well just north of the Iraq frontier, about 50 miles south of Morain in the Diarbekir district, and another at Sinope, 20 miles from the Black Sea.

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Of the 14,031,117 bbl. of fuel oil imported by Great Britain during 1931, no less than 8,147,208 bbl. were re-exported, 7,085,128 bbl. of the re-exports being shipped as bunkers in vessels engaged in foreign trade and in fishing craft.

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A possible catastrophe to the important refineries situated on the island of Aruba, including the Pan American Petroleum and Transport Company's plant, one of the most efficient refineries in the world, was averted when Dutch Government officials in Curaçao uncovered a plot by Venezuelan rebels and others to set fire to the refineries and seize the island. Eight men were being held as ring leaders in the conspiracy.

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Great Britain, as an oil importing nation, apparently takes but little advantage of the petroleum resources of her principal producing colony. Trinidad, the biggest oil producer in her entire empire, exported to the United States in 1931 nearly 80 percent of all the gasoline produced in refineries on that island from local crude, namely about 12,000,000 bbl., which is shipped as naphtha for blending with American gasoline because of its excellent anti-knock qualities. Much of this gasoline was sold at the pumps by an independent company in the New York district at prices below posted prices of major companies. Meanwhile, large quantities of American motor fuel is shipped to Great Britain where it is marketed at—it is reported—a loss of about four cents per Imperial gallon. A tariff imposed on petroleum products entering Great Britain may possibly change the movements of the Trinidad product, unless it is contracted for over an extended period. The greatest part of Trinidad's 1931 crude-oil exports was shipped to Curaçao, D. W. I., where it was refined to gasoline, fuel oil, etc. and the product re-shipped to the United States and other countries.

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Sir John Cadman, chairman of the Anglo-Persian oil company recently expressed the opinion that oil-electric locomotives could perform on 1,600,000 tons of oil the work done by steam locomotives burning 13,000,000 tons of coal; also, that within a few years it is probable that heavy gasoline engines for road transport will be supplanted by light-weight compression-ignition engines. Sir John incorporated these comments in an address before the Royal Institution on Petroleum in London on February 12, last.

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Plans have been completed for the inclusion of petroleum industry exhibits in the Chicago World's Fair opening June 1, 1933. Exhibitors of drilling and refining machinery will use a space close to the transportation building. The American Petroleum Institute has authorized the raising of a sum of $160,000 for historical and scientific exhibition. Plans include cross section models of the earth's crust at some of the famous oil fields, scale models of drilling tools and refineries, and cracking and distillation units. In addition to these models it will be possible for equipment manufacturers to display actual machinery at work. Henry M. Dawes, president, Pure Oil Company, Chicago, Ill., has been appointed chairman of the World's Fair Committee of the American Petroleum Institute, which is composed of eight petroleum companies.

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Vacuum distillation unit in an Austrian refinery.

International Drilling Congress

The International Drilling Congress which was to have been held in Berlin, Germany, during 1933 has been postponed to 1934 due to the International Geological Congress at Washington having been set for 1933. The Berlin Congress will probably take place during the month of September.

Meanwhile the German National Committee for the International Drilling Congress will issue a 1932 year book similar to that published in 1929 on the occasion of the Paris Congress. Leading German petroleum engineers, geologists and geophysicists will contribute. All National Committees may receive a copy free of charge. The mailing date will be about May of 1932.

Motor Fuel's Latest Yardstick of Quality

Tendency of Octane Number Is to Become an Indispensable Factor in Judging Anti-knock Quality of Gasoline.

By M. R. Mandelbaum

The Gray Processes Corporation, Newark, N. J.

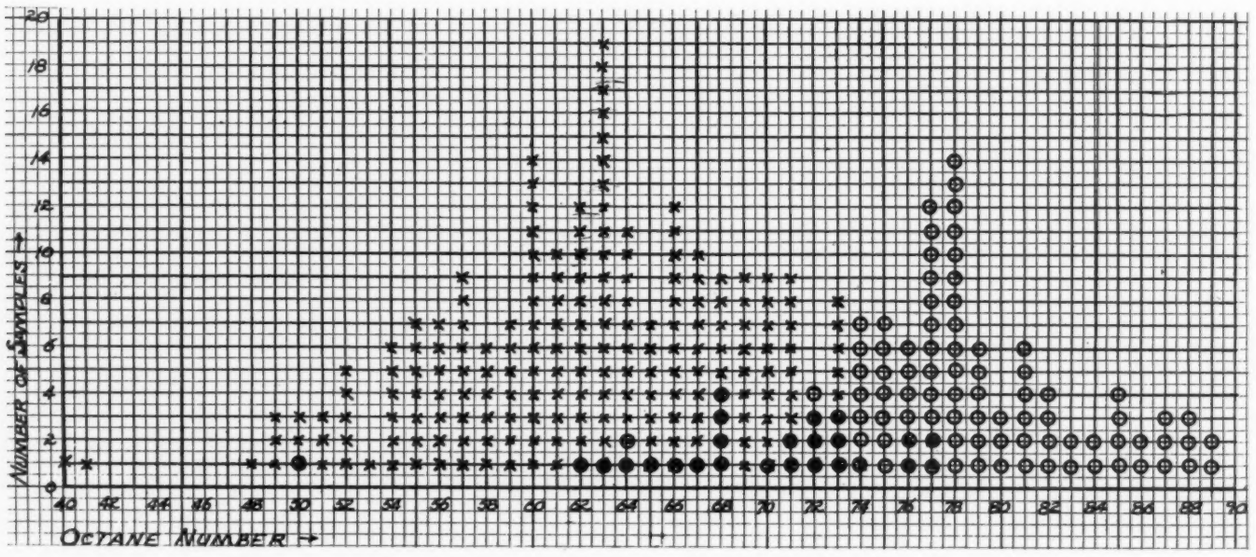
"Prices for the week—
U. S. Motor Gasoline (Oklahoma)
Below 57 octane number ..... $———"
57-65 octane number ..... $———"
Above 65 octane number ..... $———"

THE above heading, taken from a current price tabulation in the United States, shows how motor fuel is graded today. A differential of approximately 5 percent of the tank car price is maintained between adjacent grades. This price differential is the ultimate recognition in dollars and cents of a new yardstick for motor fuel quality. It has not come upon the scene unheralded, but is the result of a steady growth of several factors. Looking back over the criteria which determined the price of different grades of gasoline in the past, one realizes after understanding the full significance of the term "Octane Number" that now for the first time the grading is based on something which has a direct and important bearing on the performance of the fuel in an automobile engine.

The term is one which concerns not only the marketer, but the refiner, the consumer, and even to some extent the producer. The motorist finds, on driving up to a filling station in many parts of the United States, as many as three grades of motor fuel, variously priced, being sold by the same company. If he were to sample these materials and test them, having in mind simply the gravity and distillation range, which alone controlled the situation up to a short time ago, he would probably be puzzled as to the reason for the grade classification. If his test, however, included the determination of the Octane Number, the chances are that he would find a significant difference, with the highest priced gasoline having the highest and the lowest price the lowest. Even where the seller does not call attention to these tests, it is tacitly assumed that it is the Octane Number, or knock rating, that is the chief cause of the difference in price. This assumption may not always be justified, as the 23rd semi-annual motor-gasoline survey of the Bureau of Mines, published as R.I.3152 in November, 1931, shows. This survey, based on 312 samples taken in 20 cities throughout the United States, reports that "competitive-price gasoline," which classification includes samples purchased at or below the generally recognized local base price, ranged in Octane Number from 40 to 77. Premium-price motor fuels had a range of from 50 to 89. The accompanying distribution diagram, plotted from the data in the survey, shows graphically the number of samples of each grade of gasoline having a given knock rating. In the diagram, each sample is represented by a mark—the competitive ones by crosses, the premium gasolines by circles.

Where circles and crosses are found at the same point, two samples, one in each

Blank & Stoller



Distribution diagram showing the number of samples of each grade of gasoline having a given knock rating.

price class, are represented. This procedure was followed in order to make it possible to read each total directly from the base line. It is interesting to observe the large number of samples falling close to the 57 and 65 marks, which are the dividing lines in the price tabulation referred to at the beginning of this paper. It will be noted that there is considerable overlapping between competitive and premium fuels. Although the amount of this is less when the data for any individual city is examined, it is almost always present. This shows that retail price cannot yet be accepted as an indication of the knock rating of a gasoline, although it is reasonable to expect that such a relationship would hold for the products of any one refiner.

It is interesting to observe from the data that the spread in Octane Number between the premium and non-premium grades differs widely from city to city. It is greatest for San Francisco, where the average premium fuel had an Octane Number of 83 and the non-premium 62. It was least in Chicago, where the figures were 69 and 63 respectively. In some cases, gasolines selling below the competitive price were found to have Octane Numbers well above the average of all the non-premium grades sampled in a particular city. However, the writer does not believe that the samples selected reflect the true picture as regards the "third grade" of gasoline.

To the non-technical oil man, whose particular business may not enable him to follow closely all refining trends, the questions which come up regarding this property are probably somewhat as follows: Exactly what is meant by the term "Octane Number"? What is its true significance? How is it measured? Why do gasolines differ in this respect? And how can the Octane Number of a gasoline be controlled?

Octane Number is a purely arbitrary term, although it measures a real property. Every one who has driven a car is familiar with the tendency of the engine to knock. Knocking, it is conceded, is harmful to the engine, as well as offensive to the ear. Its cause is not definitely known, despite the fact that a considerable amount of investigation has been directed towards determining it. In the early days of the phenomenon, it was commonly ascribed to pre-ignition, or the too early explosion of the charge in the cylinder.

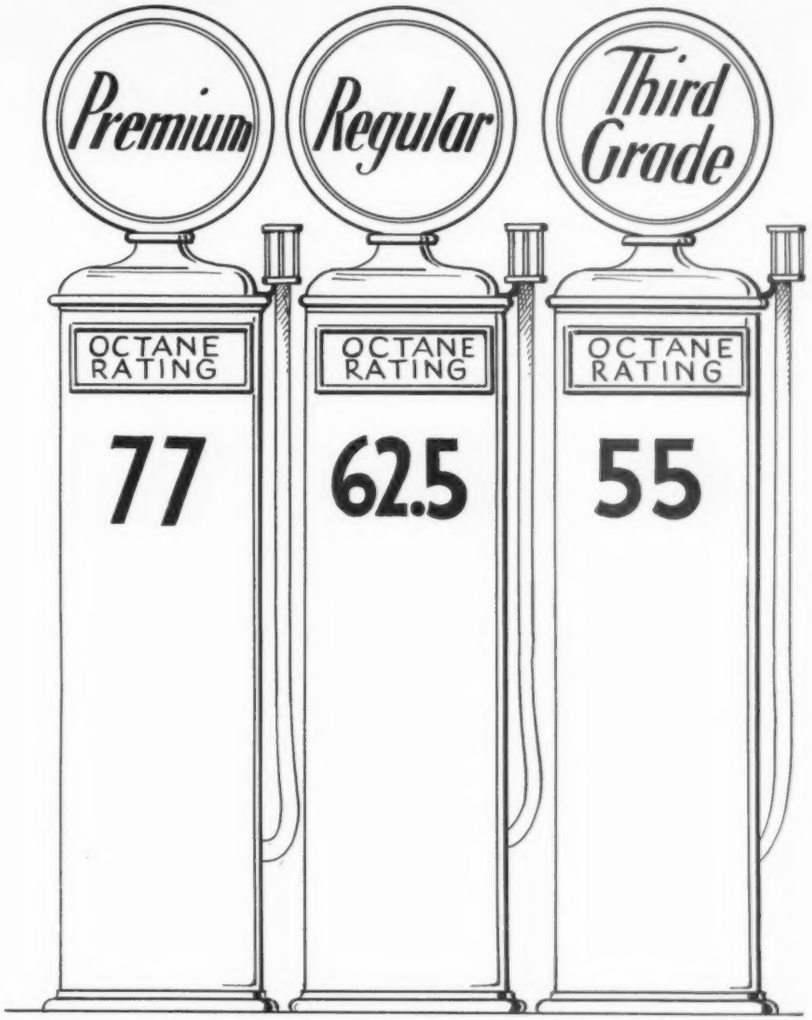
It has been realized for some time that this explanation is far too simple and that there are various other causes of knocking. Many factors contribute to the problem. The shape and size of the combustion chamber, location of the spark plugs, compression ratio, location of the valves, and the temperature of the engine all have a share. But the fact remains that, given the same engine and the same operating conditions, certain fuels will cause knocking and others will produce knock-free operation. Octane Number is a measure of the freedom from knocking of motor fuels; the higher this value, the less the tendency to knock. The Octane Number scale runs from 0 to 100 although it is possible for gasolines to test above 100. Most commercial gasolines fall in the range between 55 and 80, with a few on either side. For comparison, it might be noted that the minimum standard for Ethyl gasoline in the United States was 74 up to March 1st, and has been 78 since.

With this definition in mind we can forget for the time being that we have not yet discussed what Octane Number actually is, or why this term was chosen, and take up first some of the other questions involved.

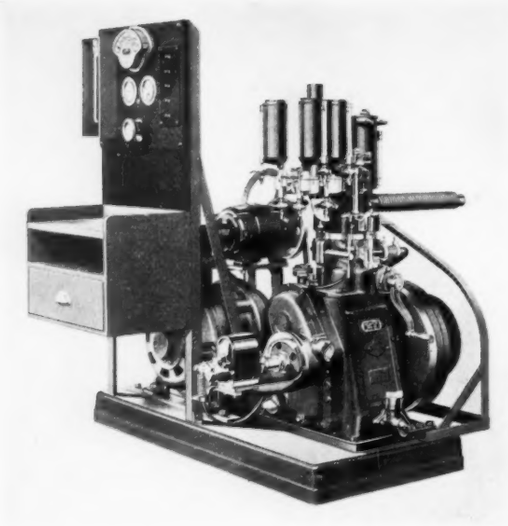
It was said above that one of the factors influencing the knocking tendency of the engine is its compression ratio. By this is meant the ratio of the volumes above the piston head at its lowest and uppermost positions. The higher the compression ratio, the greater the tendency to knock. But this ratio also influences the operating cycle of the engine in such a way that greater efficiencies can be obtained at higher compression ratios.

For many years, before the marketing of anti-knock gasoline was as widespread as it is today, motor car manufacturers were profuse in their promises of what they would do if only they could rely on the availability of a fuel which by its freedom from knocking would enable them so to design as to take advantage of higher compression ratios. Greater flexibility, increased power and better fuel economy were predicted.

With the introduction of anti-knock gasolines and the adoption of a scale which makes it possible for the consumer to know the characteristics of the gasoline he is purchasing, engine designers have in fact increased compression ratios somewhat. Some have done it on all their motors, and others have made provision for supplying either a high or low compression motor at the buyer's discretion; but



Average octane ratings that motorists get today.



Special Waukesha engine for testing the knock-rating of gasoline. It has a variable compression arrangement.

the use of the high compression motors does not seem to have had much effect on fuel consumption up to the present time. This, say the motor car designers, is due to the fact that the motoring public—at least the majority of American users of motor cars—is not primarily interested in gasoline consumption, but prefers added speed and power combined with additional stability which can only be obtained by increasing the weight of the car. The strictly economic advantages of increased compression have more or less been lost to sight on this account. The other advantages can be noted, however, so that the purchaser of a car will tend more and more to select a high compression engine.

While some manufacturers claim that by carefully designing the combustion chamber and other parts they are able to provide high compression without the necessity of using especially selected fuels, most auto engineers recommend good anti-knock, or in other words high Octane Number, gasolines for use with high compression motors. The man driving such a car will be inclined to choose the gasoline having the highest Octane Number. When accumulation of carbon increases the knocking tendencies of a low compression motor, the use of a higher Octane Number fuel will extend the period of operation before carbon removal is necessary. Consequently, at one time or another, almost every motorist will be a potential buyer of high Octane Number gasoline. Many of those who do not actually need it prefer to use it because of the added smoothness of performance it gives them on steep hills and in other cases of suddenly increased load.

The refiner, who although seeming in the early days hardly to be cooperating with the efforts of the motor car manufacturers in this direction is now wholly in accord with them, has several means at his disposal for producing motor fuel of various Octane ratings. In the first place, gasoline produced by the distillation of different crudes differs in its tendency to knock. Straight run gasoline from Pennsylvania grade crude petroleum is a very bad knocker. The gasoline present in certain other crudes from Wyoming, California and elsewhere gives much better knock performance. This shows the first means at the disposal of the refiner for controlling the knock rating; selection of the crudes from which he manufactures his motor fuel. Other factors, such as availability, enter and make it rather difficult to do much along these lines. The refiner who has access to a field of crude oil yielding high anti-knock gasoline has a natural advantage over the refiner who is not so well situated.

The method most commonly used at the present time for manufacturing a gasoline of high Octane Number is the use of one or another of the cracking processes. Introduced to increase the amount of gasoline which could be produced from a barrel of crude oil, cracking comprises heat treating heavy oils which are, because of their high boiling point, unsuitable for use as motor fuel and breaking them up into lighter oils of the proper boiling range. Not only did the adoption of cracking make it possible to furnish enough gasoline for the motor cars in use from what would otherwise have been an inadequate crude supply, but it was found that cracked gasoline has a better knock rating than straight run from the same oils. The degree of difference varies with the cracking process and conditions. In general, it may be said that the higher the temperature of the heat treatment and the more intense the decomposition, the higher will be the Octane Number of the gasoline produced.

Higher cracking temperatures also cause increased losses and add to the difficulties of refining the product. In fact, cracked gasoline cannot be used in motor cars without further processing due to its tendency to cause gum formation. In selecting a treating method the refiner must choose one which decreases the gum-forming tendency without at the same time lowering the Octane Number rating which the cracking process has, at considerable expense, imparted. The conventional method of acid treating has been unsatisfactory due to the loss of Octane Number involved. More modern treating methods, such as Vapor Phase refining, have made it possible to reduce gumming tendency without affecting knock rating.

Another manufacturing expedient that enables a refiner to produce a high Octane Number gasoline has recently been introduced. It is known as reforming, and consists in the heat treatment not of high boiling oils, but of gasoline and naphtha. The heat treatment improves the Octane Number of the gasoline treated, but with considerable formation of fixed or non-condensable gas, which is an undesirable feature. Reforming has been extensively adopted in refineries where it is impracticable to crack enough heavier oils to bring the total mixture of gasoline produced up to the required rating. Reformed gasoline also requires refining and the same considerations hold as were mentioned above.

All other things being equal, the knock rating of a gasoline is dependent to a considerable extent on its volatility. A given straight run or cracked gasoline having an end boiling point of 375 deg. Fahr. would have a much higher Octane rating than the same gasoline cut to a 425 deg. Fahr. endpoint. This is not a function so much of the endpoint as of the volatility of the gasoline as a whole. Accordingly, it has been found that the addition of very volatile gasolines such as "natural" or "casinghead" to either a straight run or cracked gasoline will raise the Octane Number of the mixture up to a certain point. This gives the refiner still another means of regulating the knock rating of his motor fuel.

Besides the manufacturing processes to which refiners can resort in an endeavor to increase the Octane Number or anti-knock rating of their gasoline, there are a number of materials available from non-petroleum sources which can be added to motor fuels to serve the purpose. Of these the one first used to any considerable extent commercially was benzene (benzol), a product of coal tar distillation. This liquid has such high anti-knock properties

Dr. Graham Edgar who initiated the octane rating movement in 1926.

that it is said to be impossible to make an engine knock while operating entirely on it. Mixtures of benzene with gasoline give varying Octane Numbers, depending on the gasoline base and the amount of benzene added. The use of benzene for the purpose is subject to serious disadvantages. It must be added in relatively large amounts, but the supply available is limited, and the crude product is contaminated with sulfur-containing impurities which can be removed only by costly treatment.

Methyl and ethyl alcohol (wood and grain alcohol) also are relatively knock free and tend to improve the Octane rating of the gasoline by being mixed with it. Because of their cost and limited miscibility with petroleum products alcohols are used only sparingly for this purpose in the United States. In many other countries, the addition of alcohol is not only encouraged, but required by law. This is not so much for the purpose of improving the knock rating of the gasoline as to promote the use of alcohol, which in most cases is the product of a sizable home industry.

The substances so far mentioned must be added to gasoline in relatively large proportions in order to increase its Octane Number. Opposed to these are substances of another type technically known as knock inhibitors, which have the property of increasing the Octane Number of motor fuels greatly by relatively small additions of the substances. These materials have been developed largely as a result of trial and error. They include aniline, tetraethyl lead, iron carbonyl, and other substances.

Tetraethyl lead is the chief ingredient in ethyl fluid, which has achieved considerable use in the United States and other countries. Iron carbonyl has been used to a limited extent in Germany. These substances are almost all poisonous, and their use tends to increase the poison hazards inevitably accompanying the use of all motor fuels, both as regards the fuels themselves and the products of their combustion in automobile engines. A Governmental investigation several years ago resulted in the approval of the use of ethyl lead in the United States provided a definite maximum proportion (approximately one-tenth of one percent by volume) is not exceeded. Its use is also allowed in Canada and England, among others. On the other hand, it is understood that France does not permit its use.

Thus it can be seen that the problem of producing gasoline of the proper knock rating for modern automobiles can be solved, at least partially, in several ways. Up to a short time ago, however, there was considerable confusion as to the relative merits of these different methods and of gasolines produced by them. This was largely caused by the lack of suitable means of measurement and comparison. Two things were required: first, a means of measuring the knocking tendencies of the fuels and then a scale by which they could be reported and compared. Various ways of accomplishing the first step had been suggested, all of which ultimately depended on the actual performance of the fuel in a motor. Measurement of the knock was made by ear at first. Later, the bouncing pin, which sums up the knocking by means of an electrical current flowing through contacts forced together by the increased pressure in the cylinder during knocking, was adopted. A scale of comparison was still necessary. In view of the use of benzene as an anti-knock agent, the first scale devised was a benzene scale. Pennsylvania straight run gasoline was taken as zero in the scale and the knock tendency of unknown fuels was compared with mixtures of benzene in the Pennsylvania gasoline. This method was not satisfactory, because even Pennsylvania gasolines differed somewhat, and because individual operators got widely divergent results.

Recognizing the fact that the behavior of the individual compounds in petroleum and compounds of similar types, as regards knocking, was an important factor in any study of knocking and anti-knock agents, the Ethyl Gasoline Corporation instituted a program of intensive research in the course of which they made many hydrocarbons of different types and studied their knocking behavior. During this study, it was noticed that two stable compounds having a volatility not very different from that of gasoline, exhibited markedly different behavior on knock testing. These compounds are both liquids comprised solely of carbon and hydrogen. In their ultimate analysis they differ by the same extent that wood alcohol and grain alcohol are different from each other. However, they are not alcohols and neither of them is potable.

Dr. Graham Edgar and his co-workers found that normal heptane, which is one of nine compounds all having the ultimate composition corresponding to heptane, is a very bad knocker, while one of the 18 octanes, iso-octane, is a very good knock suppressor. They found further that the knocking tendencies of these materials were additive, and that by preparing mixtures of heptane and octane in different proportions, they could obtain, under normal engine operating conditions, every result from a significant knock to no knock at all. As a matter of fact, almost all gasolines sold commercially today can be duplicated, so far as their knocking reactions are concerned, by mixtures of heptane and octane ranging from 50 to 80 percent by volume of the latter. Since normal heptane and iso-octane are both definite chemical compounds and can be prepared in the required state of purity, this furnished a scale on which all gasolines could be measured.

It was suggested by Dr. Edgar that the knocking tendencies of an unknown gasoline could be duplicated by a known mixture of iso-octane and normal heptane and the result then expressed in terms of the percentage of octane in the mixture. This percentage is what is known as Octane Number. The suggestion has found wide favor in the industry and is being used almost universally. The raw material from which normal heptane is made is obtained from a relatively rare species of pine, and iso-octane is manufactured by an involved chemical synthesis. Both are in consequence very expensive, and their use for every test would make the cost prohibitive. So-called secondary standards have been developed which make it possible to determine Octane Numbers without the need of recourse to the substances themselves except in order to check the standards at intervals.

Even with the use of a definite scale different results can be obtained, depending on the type of motor used and the conditions set for making the comparison. With a view to eliminating this difficulty, the Cooperative Fuel Research Committee has been developing an engine and technique which would be suitable. Considerable progress has been made, and the equipment known as the C. F. R. testing unit, manufactured by the Waukesha Motor Company, is in use today in a large number of refineries and research laboratories.

The combination of an accepted rating scale and a satisfactory engine have resulted in a testing method which, while not entirely free from criticism, has been found acceptable even as a price determinant. Whether the increased use of high compression engines and the consequently increasing need for a knock-rating standard will make Octane Number an indispensable element in judging gasolines, or whether something else will in time take its place, cannot be predicted. But its use is undoubtedly a rational development with much to be said in its favor.

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Synthetic Rubber Again

RUSSIAN Scientists are said to have succeeded in obtaining synthetic rubber from petroleum on a commercial basis. Research and various tests in this direction are known to have begun in 1918.

Petroleum Industry's Shifting Horizon

American Institute of Mining and Metallurgical Engineers Members Review Petroleum Industry's 1931 Developments. Marketing Trends Show Marked Change.

THE Petroleum Division of the American Institute of Mining and Metallurgical Engineers, at the Institute's 141st annual meeting, reviewed the progress of the oil industry in 1931.

Amos L. Beaty, president of the American Petroleum Institute, expressed himself in favor of Government legislation which would prohibit production in excess of consumption or market demand, thus preventing economic waste. Necessity for such action was indicated according to Mr. Beaty by the inadequacy of self-control in the past. The national importance of the petroleum industry was emphasized by the statement that it has some 2,000,000 investors, a total capitalization of $12,000,000,000, employs 2,500,000 workers, and yields a tax revenue in normal times approaching $1,000,000,000 annually.

Declining U. S. Exports

E. B. SWANSON, chief economist, Petroleum Economics Division, U. S. Bureau of Mines, made a detailed survey of the Influence of Foreign Demand on the Domestic Oil Situation. The primary fact stressed in this survey is that foreign production of gasoline has been increasing more rapidly than foreign demand, and consequently a larger share of foreign business is being supplied from foreign sources. The ratio of gasoline shipments from the United States to the total shipments of the ten leading gasoline-producing countries dropped from 72 percent in 1924 to 49 percent in 1930, and further plunged to about 40 percent in 1931. Thus while the domestic demand for gasoline increased by some 7,000,000 bbl. in 1931, an eminently satisfactory showing during the current depression, foreign demand for United States motor fuel decreased by 18,000,000 bbl., resulting in a net loss of about 11,000,000 bbl. in the total gasoline demand. Such a large reduction in the total demand did not fail to affect the statistical position of the domestic industry, causing a large, and unexpected, accumulation of gasoline stocks, which reached 48,000,000 bbl. on April 1, 1931. The U. S. planning bureaus, the Federal Committee and the American Petroleum Institute, again overestimated the foreign demand for the April-September period of 1931, figuring a 15.4 percent decline in exports, a drop of 5,300,000 bbl.; actually the decline reached 29 percent, a drop of about 10,000,000 bbl., thus again upsetting the anticipated balance between supply and demand. Latest estimates of foreign demand for the close of 1931 and the beginning of 1932 proved to be correct.

The countries greatly increasing their gasoline exports in 1931, and consequently displacing U. S. gasoline, have been:

(1) U. S. S. R., which shipped 12,475,750 bbl. during the first 10 months of 1931 as compared with 10,317,300 bbl. during the same period of 1930, an increase of 21 percent;

(2) Roumania, which increased its gasoline exports by 89 percent, shipping from Constantza 9,220,000 bbl. during the first 10 months of 1931; and

(3) Dutch West Indies, which re-oriented their exports, shipping to United States in 1931, 2,572,007 bbl. less than in 1930, at the same time increasing their shipments to Europe, Latin America and elsewhere by 2,450,226 bbl.

Generally similar situation has existed with fuel oil, actual declines of United States exports of this product having started in 1927. The outlook for lubricating oils is somewhat better for the immediate future, though foreign refinery construction will affect exports of this commodity as well, in the more distant future.

It is concluded that the resumption of normal foreign demand for gasoline, or even its increase, will be more than taken care of by the increased refining construction abroad. More and more, therefore, the American oil industry will have to base its operation on domestic demand alone.

U. S. Marketing Developments

SIDNEY A. SWENSRUD, assistant to the president of the Standard Oil Company of Ohio, reviewed the Economics of Domestic Marketing. Revolutionary changes in domestic practices were indicated. Third-grade gasoline was generally introduced by the major companies to meet demand of lower prices and to compete with the independent marketers, the dealer discount or agency commission on this new grade was cut to one cent per gallon. Anti-knock qualities of regular grades were greatly improved through introduction of octane scale ratings, this development reducing the percentage of sales of premium price gasolines, on which much wider margins existed; it also increased the cost of manufacture without any corresponding increase in price; and finally, it promoted the introduction of third grades as better stocks had to be used for the manufacture of regular grades, thus leaving more inferior anti-knock material which could not be utilized for the first two grades.

Auxiliary merchandizing was taken up by marketing oil companies, filling stations handling tires and other automotive products. Also trades not associated with the oil industry have taken up selling lubricating oils at greatly reduced prices, generally at 50 to 60 cents per gallon, mail order houses, department stores and hardware stores participating in that movement. A tendency toward discontinuation of the policy of loaning equipment to dealers and consumers, such as pumps and tanks, is also noted. It is concluded that the adjustment of the marketing expense to a fair price based on economic realities is the only solution; a further decline of the margins on gasoline and oil is predicted.

A graphic survey of the California gasoline-marketing debacle, typical as well of other centers of consumption is presented in the self-explanatory chart on the following page.

Proration

JOSEPH E. POGUE, consulting engineer, discussed impartially the Economics of Proration. On the balance sheet of proration the following unfavorable factors are noted: (1) proration has contributed to the building up of a huge invisible inventory; (2) it translated the state of overproduction into one of excess capacity; (3) it increased the costs; (4) it retarded the essential economic adjustments in the industry and (5) it served to introduce a political factor into the administration of oil business. On the

other hand proration has aided in the establishment of the principle of ratable takings, an important step toward unit operation, and also it has increased the operating efficiency.

Refining Developments

H. W. CAMP reviewed Developments in Refining Engineering during 1931. The most important factor of 1931 has been the development of anti-knock gasolines. Straight-run gasolines generally have low anti-knock value, and in order to convert this material to a higher quality it has been found necessary to crack an increasing percentage of the crude oil charge. By completely cracking the heavier portions of the crude and blending back with the straight-run gasoline, it has been possible to produce an average of 63 to 65 octane number gasoline in Mid-continent. This operation carried to the fullest extent does not suffice, however, and the recent and rapid development of the so-called "re-forming unit," has resulted. The straight-run gasoline fraction is cut into two parts: a light, low boiling point gasoline; and a heavy gasoline or naphtha. The latter containing the low anti-knock portions of the gasoline, is sent through a re-forming unit and subjected either to high temperature or pressure, or both, which materially increases its octane number. On average Mid-continent the blend of low boiling point straight-run, re-formed material and regular cracked gasoline results in a product of approximately 70 octane number. Some progress has also been made in the development of cracking units which will charge crude oil direct and thereby combine the several phases of topping and cracking in one operation, producing a high ultimate yield of gasoline possessing high anti-knock characteristics.

California

V. H. WILHELM presented a paper on California Petroleum Industry. After reviewing the past year's developments, stressing (1) the continuance of curtailment of crude oil production, (2) the gasoline price-slashing war from March to June, (3) the decline in total completed wells from 755 in 1930 to less than one-half of that figure in 1931, and (4) the improvements in drilling and producing practices, including extra heavy equipment for drilling to 9,000 ft., or more, also improvements in design and materials, and the developments trending toward successful production of very deep wells, the author reached the following conclusions regarding the outlook for 1932:

(1) Deep zones, of which there are many in the State, will be held intact as far as possible;

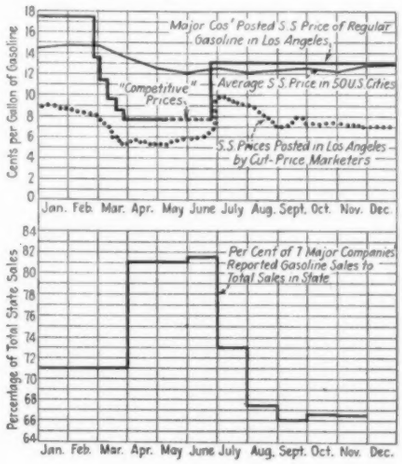
(2) New discoveries of fields as well as deep zones will be unitized wherever practical;

(3) In town-lot fields of the Los Angeles Basin, where it is impossible to obtain effective curtailment, a high rate of production will be maintained so as to reduce the overproduction, by depletion, from these fields as soon as possible;

(4) New discoveries of oil fields during 1932 in California will be limited because the percentage factor of discovering new fields is decreasing each year; also wildcat wells will be drilled on the basis of very complicated geology, rather than simple apparent structural conditions as in the past.

Michigan, Ohio and Indiana

M. G. GULLEY, assistant geologist, Gulf Oil Company, reviewed the Developments in Michigan, Ohio and Indiana. The only major discovery in this area was the 4½-mile extension to the east of the Mt. Pleasant field in central Michi-


Major Cos' Posted S.S Price of Regular Gasoline in Los Angeles
"Competitive" Prices
Average S.S Price in 50 U.S Cities
S.S Prices Posted in Los Angeles by Cut-Price Marketers
Cents per Gallon of Gasoline
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
Per Cent of 7 Major Companies Reported Gasoline Sales to Total Sales in State
Percentage of Total State Sales

Illustrating Sidney A. Swensrud's paper outlined on page 120.

gan, which started 1931 with a potential production of 6,000 bbl. per day and closed the year with a potential of between 25,000 and 30,000 bbl. per day, from approximately 330 wells. Crude oil prices in the Mt. Pleasant district were affected negatively by the new supply, proportionally falling below Mid-continent quotations.

F. H. KAY, assistant to the president, Pan American Petroleum and Transport Company covered Petroleum Developments in Venezuela. The total production in 1931 sustained its first break in its steady rise since 1920, falling 18,904,000 bbl., or 13.7 percent, under 1930. This reduction was caused entirely by the restriction of output and of drilling operations in harmony with decreased demand. Only 116 wells were completed in 1931 as compared with 401 in 1930; a total of 2,653 wells have been drilled in Venezuela to the middle of 1931. The Bolivar coastal fields on the eastern shore of Lake Maracaibo, which were extended about 14 miles southward during the year by the discovery of Bachaquero field, continued to supply most of the oil, accounting for about 74 percent of the production of the country. La Concepcion, Los Manueles and Quiriquire all showed marked increase in production during 1931, La Concepcion increasing from 3,301,000 bbl. in 1930 to 4,602,000 bbl. in 1931, Los Manueles from 267,000 bbl. to 3,255,000 bbl. and the Quiriquire from 1,150,000 bbl. to 3,153,000 bbl. A new field of light oil, 48.6 deg. A. P. I., was discovered by the Standard Oil Company of Venezuela and North Venezuela Petroleum Company, Ltd., on the north coast near Puerto Cumarebo, State of Falcon, producing from 627 ft. about 260 bbl. through ¼-in. choke.

IONEL I. GARDESCU, petroleum engineer, Oil and Gas department, University of Pittsburg made a survey of Petroleum Developments in Rumania during 1931. The high lights of the past year have been:

(1) Termination early in the year of the operators' curtailment agreement, which attempted to keep production within 100,000 bbl. per day mark. As a consequence the year's production was 49,210,000 bbl., an increase of 18.4 percent over 1930.

(2) Development of deep Meotic pays in Moreni, Gura-Ocnitza, Boldesti and Aricesti fields. In Boldesti the Meotic encountered at 5,800 ft. yielded crude testing 38 deg. Be, containing 22 percent gasoline; the reservoir pressure averages 2,500 lbs. per sq. inch.

(3) Improvement in drilling methods, rotary tools being used exclusively for development of deep Meotic pays. Casing plans have been revised, one string only being used for 5,800 ft. wells in Boldesti field, reducing the cost of a well to $11.00 per ft. from around $30.00 per ft. in 1925.

(4) Cost of production was reduced from 67 cents per barrel in 1921 to 33 cents in 1925 and to 22 cents in 1931.

(5) Overproduction and international petroleum situation affected Rumanian petroleum industry most adversely. The value of the oil produced has dropped from $68,750,000 to $18,690,000 in two years.

(6) Notwithstanding the taxes remained very high. On light gasoline, valued at $1.42 per barrel, taxes total 53 cents per barrel; on kerosene, valued at 39 cents, taxes total 28 cents; and on fuel oil, valued at 20 cents, taxes total 29 cents.

(7) Domestic consumption in Rumania being small, 75 percent of country's production has to be exported at any price, thus accounting for dumping of Roumanian gasoline at Detroit and Baltimore.

BASIL B. ZAVOICO

Today's Conditions and Tomorrow's Stock Prices

Effect of Security Market History and Current State of Petroleum Industry on Near Future Oil Share Prices.

By Leon R. Gurley

Excerpts from paper read before A. I. M. & M. E., New York

SETTING up of a guidebook, indicating the relation between the trend of stock market prices and economic conditions within the industry, would be of great benefit; but no such Utopian statistical scheme has yet been devised that will tell today the market prices of tomorrow. The purpose of this paper is to make a study of stock market history as compared with the economic history of the oil industry, and then attempt to determine what factor or factors, if any, predominantly govern market fluctuations of oil securities.

Economic ups and downs of the oil industry are based primarily upon the supply and demand of petroleum and its products, while the ups and downs of the stock market are based upon the supply and demand of securities. This is a fundamental difference and cannot be emphasized too strongly. The trend of petroleum economics can, and quite often does, follow the same course as that of security economics, but it is also possible for them to travel counter to one another. In such a situation the problem is to determine which is the stronger influence.

Does the stock market forecast the economic situation in industry or does it merely reflect that situation? In my opinion, the stock market never actually forecasts anything at any time. It simply reflects the opinion, right or wrong, of some one or many security holders as to the future desirability of holding certain or any stocks. In general, it may be said that the market action may only be used as a forecast by outsiders in that it reflects the personal opinions of the more or less insiders, whose opinions, while valuable, are by no means infallible.

In order to give a compact history of stock market action, there is shown in Figure 1 a chart of price ranges of three groups of stocks from the beginning of 1918 to the end of 1931. That interval covers the crests of two bull markets, the bottom of the 1921 depression and what we hope is the approximate bottom of this one. The chart shows the action of the general market as represented by 337 industrial stocks, of the railroad group as represented by 33 stocks and of the oil group as represented by 16 stocks. All figures are relative with 1926 levels considered as 100.

Figure 2 shows the same oil curve as Figure 1 and also the commodity price curves for "All Commodities" and "Petroleum Products." There is also included a curve of oil company earnings per share, made up from the earnings records of the New Jersey, Indiana, Ohio and California companies, and adjusted for all changes in shares outstanding. Here again all figures are relative with 1926 taken as 100.

The most striking point brought out is that all groups of securities move almost at all times directly with one another. This would tend to prove that for any short term the predominating influence in the movement of the oil shares is the general market condition. The economic situation within the industry is reflected only in the comparative ratios of the rise or fall. In other words, when oil conditions are better than the general industrial conditions, oil shares will go up somewhat more than the general market in its rises, and will go down somewhat less than the general market in its declines. When oil conditions are comparatively unfavorable, the reverse is true.

Referring to Figure 1, it is seen that prices moved sharply up with favorable conditions on all sides from the time the war tide turned in our favor early in 1918 until labor troubles appeared in many industries late in 1919. These and a stiffening of money rates then broke the general market, which was followed by the oil group in spite of a very healthy price situation coupled with the fear of an oil shortage. Oils again followed the general trend in 1920, in spite of its very excellent condition. Here the general situation completely overcame the good news and the high earnings in the oil industry. The action of the oil shares in 1920 is one of the most contradictory in the history of the Stock Exchange and should be studied carefully by anyone who believes he has a system to forecast group action of securities.

The general economic situation touched bottom in 1921 and from that point, in spite of occasional setbacks the trend was steadily upward till 1929. Due to internal difficulties the oil securities, while following the general market closely, suffered more severe setbacks and enjoyed smaller advances. The threat of demoralization, introduction of cracking, overproduction and opposition to proration coupled with the severe setbacks growing out of a breakdown of gasoline prices in 1925 and the threat of the Seminole field in 1926–27 caused oil securities to sell at approximately the same levels in 1928 as they had in 1922 in spite of the fact that the general list was about double its 1922 level.

The oils actually lost nothing in dollar value, but, in comparison with the general market, they depreciated 50 percent. That comparative value feature is one of the most important in investment banking and the least considered by the average security holder. In my opinion, it is the predominant producer of profits.

Returning to Figure 1, it is seen that the oils finally participated in the bull market, beginning in 1928, but even then did not quite keep pace with the industrial list. They matched the general market move for move through 1928 and 1929, but declined contrary to the general trend early in 1930 on the bad gasoline situation. The momentum of the general market, coupled with better gasoline consumption reports, reversed the oil shares in April and all moved together again until the military shut-down occurred last summer in Oklahoma and East Texas. Here the sharp price recovery and the enactment of the Texas conservation law was sufficient to overcome the bad general outlook, and for a time the oils moved up against a general decline. Nineteen thirty-one closed with all groups at extremely low levels, and with the oils comparatively lower than the general market.

The logical starting point for an analysis of the present position of the industry is in the crude producing division. We know there is about seven months' supply of crude oil in storage above ground. That is too much, but it is not in itself a menace to the industry or to the oil securities. Proven reserves in the ground are ample to preclude any shortage of supply for some time to come. The underground supply has worked against the economic welfare and the stock market welfare of the industry in the past, as it furnished a constant threat of a flood of distress oil which would, and finally did, bring on an utter collapse of oil prices. California, Oklahoma, Texas and Kansas now have laws enacted which can control and are controlling the producing situation. Also, the spirit of cooperation within the industry is constantly growing. Since a controlled reserve is merely a reservoir of raw material for the industry, it is, instead of a menace, a guarantee of future stability. From past market action, this should be constructive news as soon as the public fully realizes the improved situation.

Oil prices are still below normal, but are above their low point of last summer and

should slowly work somewhat higher. Producing companies are on the mend, and, although their earnings are still far below normal, so are security prices. An additional source of income in recent years is the industry's expanded ship and pipe line transportation facilities, securing for the oil companies the large sums formerly paid to railroads. Companies which are purely or predominantly pipe line companies should be watched carefully. Their past prosperity may be their future misfortune. They can easily be left out in the cold and are for that reason extremely vulnerable. Any adverse decisions on the pipe line rates will be reflected in pipe line stock prices.

A 15-year survey of petroleum refining shows several things: First, a doubling of the gasoline yield of a barrel of crude oil coupled with an improvement of the product. Second, a reduction in the cost of refining. Third, a large increase in refinery investment per barrel of output. And, finally, an overexpansion of refining capacity. These points are all related and developed together. Investment went up because new equipment was needed to meet the competition of an improved product.

The present moment finds the industry as a whole with sufficient modern equipment for its needs and, in addition, much somewhat older equipment still in operation but producing an inferior product from a laboratory standpoint. Direct price competition between what were supposed to be non-competitive products may disappear with the depression; but the near term prospect for any great improvement in refining profits is not encouraging. Refinery prices will probably be governed largely by fluctuations in crude oil prices, but there appears to be no reason to expect any increase in the spread between crude and refined oil markets. In fact, the refusal of the refiners to limit production to sales requirements may force refined prices lower as the weaker units feel the financial pressure of carrying these excessive inventories.

In my opinion, an increase in gasoline stocks as computed by the U. S. Bureau of Mines to around 50,000,000 bbl. by Spring will again create a large distress supply and make 1932 another low refining profit year. On the other hand, an inventory total of 40,000,000 bbl. in April would practically assure fair prices during the year and put the entire industry far along the road to recovery. This is not an original thought, but the policy of the refiners as to production and inventories appears to be the biggest single point to consider in any study of the action of oil securities in 1932.

My guess is that gasoline stocks next April will be between 45,000,000 and 50,000,000 bbl. That will prevent demoralization, but will also prevent seven cent gasoline in Group 3. In other words, I look for another 1931 from the refiners which will be no improvement; but neither will it be any worse, and there will be no inventory adjustments.

Over investment in the marketing branch of the industry appears to have been thoroughly deflated in the decline of oil securities, and a reasonable margin exists for efficient marketers as demonstrated by records of purely marketing companies. With all companies now engaged in study of efficient marketing I believe the stockholder need have no fears regarding his investment in this branch.

The total petroleum market has shown less depression decline than that of any other major industry, and there is no apparent reason to suspect much further decline now. With a gross volume of sales very near to its high record levels and an indispensable product, the only requisite for normal earnings is a price recovery to normal levels.

Let us refer to Figure 2 and consider the commodity price curves. Eliminate 1920 and 1931, as neither is normal. We find a steady gradual decline, which is explained by the mechanical improvement in American industry in general and the oil industry in particular. We also see that the earnings curve does not follow this downward trend. In other words, 1928 and 1929 proved the economic advancement of the industry to where it no longer needs extremely high prices in order to show very good earnings. During 1928 and 1929 the industry considered prices rather low, but a study of the price curve would indicate that they were probably about where they belonged. If that be true, and I believe it is, the industry is not as far below normal as popularly supposed and the road back to good earnings and prosperity is not as long as the stock market indicates.

Summarizing the outlook for the integrated companies, a small improvement in earnings appears to be in sight for 1932 with basic conditions really much improved but having a deferred effect. As these improvements become generally realized by the public, the market reaction should be favorable, since it always has in the past—since 1920. I expect oils to follow the trend of the general market, but comparatively, with more of an upward tendency.

What is the general market going to do for the next few months? Economically, the absence of good news would point to a continuation of the decline; but we know that it cannot duplicate 1930 or 1931 in that respect. There is not room enough. Every stock has a bottom price, which is based on the knock-down value of its assets and on its management record. A great number of stocks have reached that point.

Stocks on the two New York exchanges which are still obviously overpriced are few and far between. Many companies are buying their own stock and retiring it, which, from a market standpoint, is very constructive. Investors are buying bargains to put away and forget. As prices continue to sink these forces will continue to grow until a balance is reached between them and the supply. You will then have reached the bottom of the bear market. For various reasons, including my belief that too many stocks have reached or are approaching their minimums, I look for prices to flatten out shortly after the turn of the year and be followed by an irregular and rather aimless market for a considerable period. That, of course, does not take into consideration any "economic lightning," either good or bad, hitting the general market. Germany is still a threat, Manchuria could stir up a bad market situation, the railroads are reducing wages, and Congress is in session, so I must qualify my opinion to the extent of saying it is based on conditions apparent on January 1, 1932.

Unless the general market is hit by a disturbance of extreme panic proportions, the oils should already be at their approximate lows. All available figures point to the comparative advantage of oil securities over any other major group from the standpoint of present investment value as well as that of more rapid recovery in the future.

Figure I

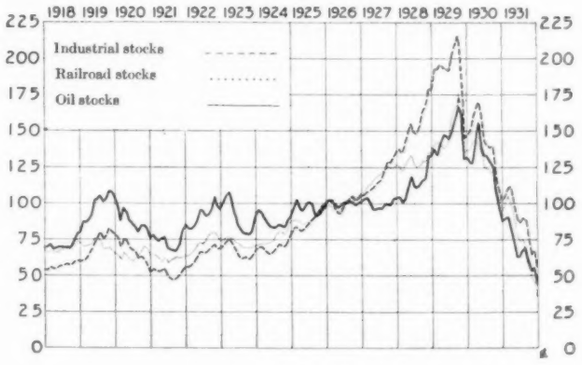
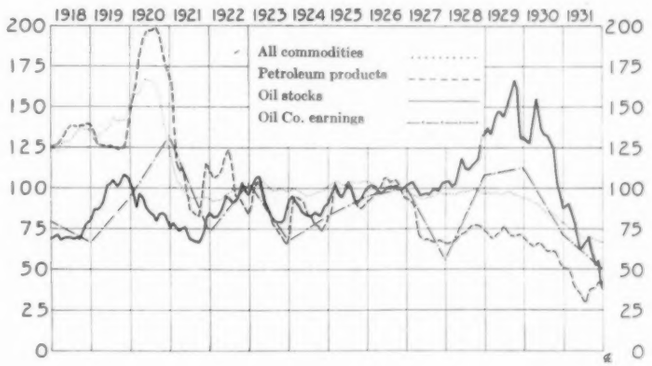


Figure II



Accelerating the German Oil Industry

Increasing Production Activity Coupled with Plans for Reorganizing Marketing on Efficient Lines Indicates Profitable Operation. Bavaria to Be Drilled by American Interests.

AGGRESSIVE action on the part of the German Government to reduce petroleum imports was discussed in last month's WORLD PETROLEUM. The "standard motor fuel" proposed, 70 percent petrol and 30 percent benzol and alcohol, will not only improve the balance of trade by calling for lessened petroleum imports but also stimulate the domestic industries supplying benzol and alcohol.

The determination to press the matter seriously is also indicated by a suggestion to compensate for the higher cost of alcohol by reducing marketing costs, as by eliminating one-half of the gasoline pumps in the Reich. Such measures as these will doubtless be joined to methods of stimulating the production of German crudes to reduce further the imports required.

Since deeper drilling by the Elwerath Company at Nienhagen and the Preussag at Eddelsee some 18 months ago developed larger wells than the previous completions there, the salt dome fields of the Hannover district have not had a market for their entire potential output. This will be largely remedied during the coming spring when the joint pipe line and refinery constructed by the Elwerath-Preussag interests begins operations.

Of equal importance is the rapidly increasing production of the Volkenroda District where "subterranean" wells are drilled down from underground galleries in the potash mines. The output of these latter wells increased during 1931 until they are now furnishing 40 percent of Germany's production, and it is all taken by the I. G. Farben for their Leuna hydrogenation plant.

Explorations for new reserves likewise show an acceleration in the North. The Royal Dutch interests are drilling in the State of Oldenburg and in the South the Hammond interests are actively investigating their large concession in Bavaria. This latter grant of 7,800,000 acres is held by the Bayerische Mineral-Industrie, A.-G. of Munich, of which company John Hays Hammond, Harris Hammond and J. Elmer Thomas hold a 90 percent interest in their Delaware company, the Bavarian Oil and Gas Corporation.

The lands covered are in the Alpine Foreland, a Tertiary basin 180 miles long and 120 miles wide, extending from the Danube River on the north, to the Tyrolean Alps on the south, and from Lake Constance on the Swiss Border on the west to the Austrian frontier on the east. In climate and topography it is similar to Southern Wisconsin or Michigan with low rolling hills of glacial gravels, numerous lakes and forests, besides the excellent farming and dairying lands.

The Tertiary formations exposed resemble closely the Miocene and Pliocene of Southern California but outcrops are too sparse to permit geological mapping and geophysical exploration under the supervision of Dr. D. C. Barton, of Houston, Texas, has been prosecuted for the past year. Magnetic and gravimetric reconnaissance has been carried on to determine the regional conditions underlying the basin and during the coming season these general studies will be concluded.

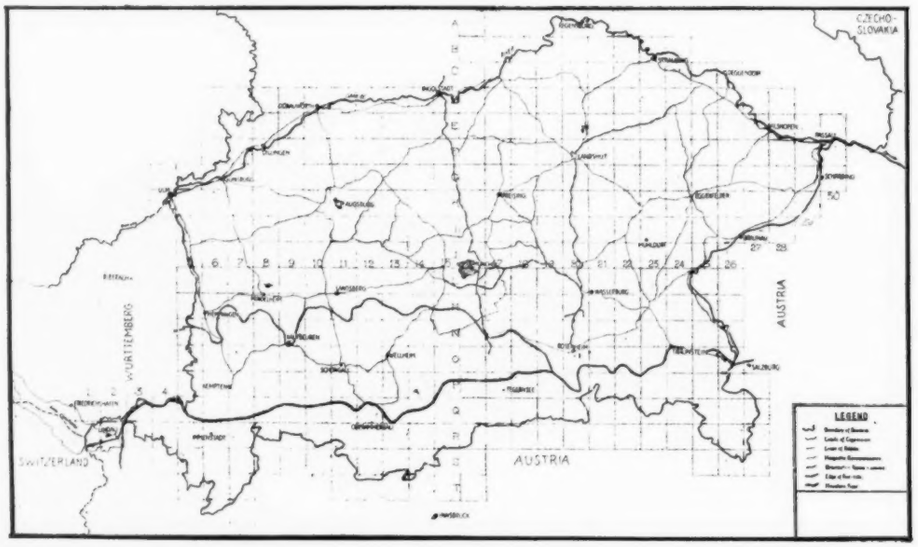
Traverses, cross-cutting the basin, have been made with stations only 200 meters apart so that where readings have been taken for these reconnaissance lines, close detailing has also been done along those profiles. A highly folded condition is disclosed and the present data definitely reflect anticlines in the Tertiary formations where production is expected.

An oil seepage near Tegernsee at the edge of the mountains has been known for several years and a small well there pumped by hand produced 28,000 bbl. of light gravity oil. To the East, along the Austrian boundary, numerous showings of gas have been encountered in wells drilled for water and in some instances have been hooked up for domestic utilization. A short distance across the line in Austria there is a gas field near the town of Wels and several wells, notably one at Taufkirchen, have shown important amounts of oil.

The Bavarian Basin is a part of the belt of Tertiary rocks which extends across Europe from eastern France, through Switzerland, Bavaria, Austria, Czechoslovakia and Poland into Roumania. In addition to numerous showings of oil and gas the producing fields of Czechoslovakia and Poland occupy this zone. It has been less thoroughly prospected at its western end and the careful geophysical studies now being made in Bavaria may disclose additional oil resources in Germany to the further benefit of their balance of trade.

At the present time the petroleum requirements of Germany are about 100,000 bbl. daily against a domestic production of approximately 5,000 bbl. daily, which, however, can be increased to 10,000 bbl. daily from present known areas. To build up from that point to their full consumption requirements allows plenty of room for wildcatters, who have in their favor the benefit of import duties against foreign crudes amounting to $4.00 per barrel.

Map of Bavarian oil concessions held by Bayerische Mineral-Industrie A.-G., controlled by American interests.



Developments in Australia's Complex Market

Shell-Mex and B. P. Ltd. Merger Begins to Affect Australian Market—Imports Decrease as Government Considers Lower Tariff—Shale Industry's Embryonic Activity.

Decreasing Imports

DUE to exchange difficulties and other causes a severe decrease in oil imports into Australia was registered during the last six months of 1931. General trade depression continues marked by a decrease in registrations and restricted use of motor vehicles. The action of the New South Wales Government in closing down independent bus services competing with the Government railways and tramways has also had considerable effect.

Value July to November Imports
(Pounds Sterling)

	1930 31	1931 32
Kerosene	391,656	156,477
Lubricating Oil	400,921	191,774
Gasoline	2,354,815	955,756

It is quite apparent that since the pound sterling fell large quantities of oil have been taken out of stock.

Combine Effects

SOME surprise was manifested in Sydney when the Shell tanker NASSA arrived with a cargo of gasoline for the Commonwealth Oil Refineries' installations in Sydney and Melbourne. The majority shareholding of the C.O.R., it will be recalled, is held by the Commonwealth Government, other shares being held by the Anglo-Persian Oil Company, Ltd. Although organized originally as a refining company, the C.O.R. has in recent years been receiving not only quantities of crude from Persia, but also occasional cargoes of gasoline and once-run distillates from the same source. The presence of Shell gasoline from the Dutch East Indies for the C.O.R. would seem to indicate that the amalgamation for marketing of the Shell and A.P.O.C. interests (Shell-Mex and B. P. Ltd.) in England is reaching pretty far afield.

Tariff Rate Change

SINCE the return to office of the new Lyons-Latham Government the question of duties on gasoline are again exciting interest. It has been reported that work on a proposed oil refinery in Melbourne for American interests may be suspended until the Government's policy is announced. It is understood that the Ministry will be guided by the Commonwealth Tariff Board in making its decision and that the domestic refiners may have to accept a lesser margin of protection against the imported gasoline than those now in force. The duties are now 7d. per Imperial gallon on imported gasoline and 4d. excise on that manufactured in Australia. The Tariff Board has however recommended that 3d. per Imperial gallon is too great a margin of protection and that 1½d. would be ample. It seems apparent that the Government in its difficult financial position does not desire to agree to any course that will lessen the amount of revenue accruing to the Treasury from excise duty.

Shale Oil

GREAT activity in the shale industry continues in New South Wales, several firms including the Vacuum Oil Company expressing their interest in making forward purchases of quantities of shale oil when available.

Imports

WHILE the quantity decrease in crude and motor fuel importations is striking, an equally large decrease in value—amounting to £328,963 in the case of crude and £3,375,225 in the case of motor spirit—occurred at the same time. The value of lube oils dropped only £127,488, thereby displaying a greater degree of stability than other petroleum products. Kerosene and other refined imports, representing an important item in Australia, decreased in value from £1,089,938 to £707,806 during the same period.

Australian Imports of Petroleum Products
(Barrels of 42 U. S. Gallons)

	July to June 1929 1930	July to June 1930 1931
Crude	3,488,575	2,495,819
Motor Fuel	6,853,592	4,877,030
Lube Oils	348,963	313,062
Kerosene & other refined products	1,176,058	1,004,542
Total	11,867,188	8,690,453

LUBRICATING oil prices have been increased in Australia by the major companies by six-pence per Imperial gallon to resellers who have passed on the increase by one-penny per pint to consumers. Prices are now nine shillings per gallon with an extra six-pence if in cans. At the current rate of exchange 9/– is equivalent to $1.22.

Statistics of the Australian Association of British Manufacturers (motor section) on December 31, 1931 show Australian automobile registrations to be 620,211 compared with 629,386 on December 31, 1929.

The Shale Oil Development Committee at Newnes, N.S.W., are busy on the delivery of 60,000 gal. of shale crude to the Australian Gaslight Company for gas manufacturing purposes.

A strike of store employes in major companys' depots in Fremantle, W.A., commenced on January 31, against wage reductions under the West Australian Financial Emergency Act. Practically no gasoline except for public services is being distributed with the exception of small quantities of independent gasoline.

Shell tanker NASSA unloading a cargo from the Dutch East Indies at the tanks of the Commonwealth Oil Refineries, Melbourne, Australia. The supplies for this refinery usually come from the Anglo-Persian Company, which operates in Persia on a sterling basis. The Dutch East Indies is on a gold basis.

UNITED STATES

	Daily Production	Daily Runs to Stills	Gasoline Stocks	IMPORTS FOR WEEK Total	Gasoline
Week Ending Feb. 6	2,152,700	2,111,900	41,376,000	1,359,000	248,000
	349,250*				
Week Ending Feb. 13	2,138,300	2,128,900	43,430,000	1,348,000	373,000
	327,500*				
Week Ending Feb. 20	2,108,050	2,190,400	43,792,000	2,009,000	68,000
	279,050*				
Week Ending Feb. 27	2,138,050	2,142,700	45,567,000	1,886,000	480,000
	304,750*				

Underlined figures indicate improvement in statistical position—decrease in production, runs to stills, gasoline stocks or imports.

* Production of the Rusk-Gregg field, East Texas.

Proposed Oil Taxes

DECISION of the Ways and Means Committee of the House of Representatives to make a general sales tax the main support of its plan for increasing revenue to the extent needed to balance the Federal budget has had two consequences that are of special importance to the petroleum industry. As a compromise with the advocates of a tariff of $1.00 per barrel on oil, the committee has provided a tax of one cent per gallon on crude oil, fuel oil, gas oil, and gasoline. This is equivalent to 42 cents per barrel and applies without distinction to crude and to manufactured products. As there is no drawback allowance on exportation such as usually applies to commodities on which a tariff is laid, the effect of the proposed law probably will be to prevent importations of crude. Such imports as are made are likely to be in the form of manufactured products.

The judgment of the revenue experts as to its influence is indicated by their estimate that this tax will yield an annual revenue of $5,000,000. Apparently they expect, therefore, that all petroleum imports will be reduced to something less than 12,000,000 bbl. as compared with a total of 86,000,000 bbl. in 1931 of which 13,000,000 bbl. were gasoline.

Another outcome of the tariff agitation is that it has directed attention to the fact that lubricating oil heretofore has escaped special taxation. The Congressional law makers have seized upon this opportunity and plan to impose a tax of four cents a gallon on lubricating oil whether of domestic or foreign manufacture. This is expected to add $25,000,000 to the costs of American consumers of lubricating oil and to provide an equal amount of Federal revenue. In addition to these specific taxes all petroleum products of domestic origin except lubricating oil apparently will be subjected to the general excise tax of 2¼ percent ad valorem imposed on all manufactured articles.

Oil States Compact

THE Oil States Advisory Committee met in Oklahoma on March 1 and elected H. W. Cooley of Los Angeles chairman. Other officers elected were Cicero Murray, executive director and attorney, Cullen Thomas of Dallas, Texas, vice-chairman, and Thurman Hill of Kansas, secretary and treasurer. Following the election of officers the meeting undertook to draft a bill, establishing an Oil States compact, for submission to Congress. Continued drastic curtailment of drilling and production of crude was strongly recommended as a means of obtaining a fair price for crude based on the findings of the Tariff Commission. This body has placed the cost of producing domestic crude at $1.10 per barrel as an average for the Mid-continent area. Further drastic curtailments are expected to be recommended on April 1.

Prices

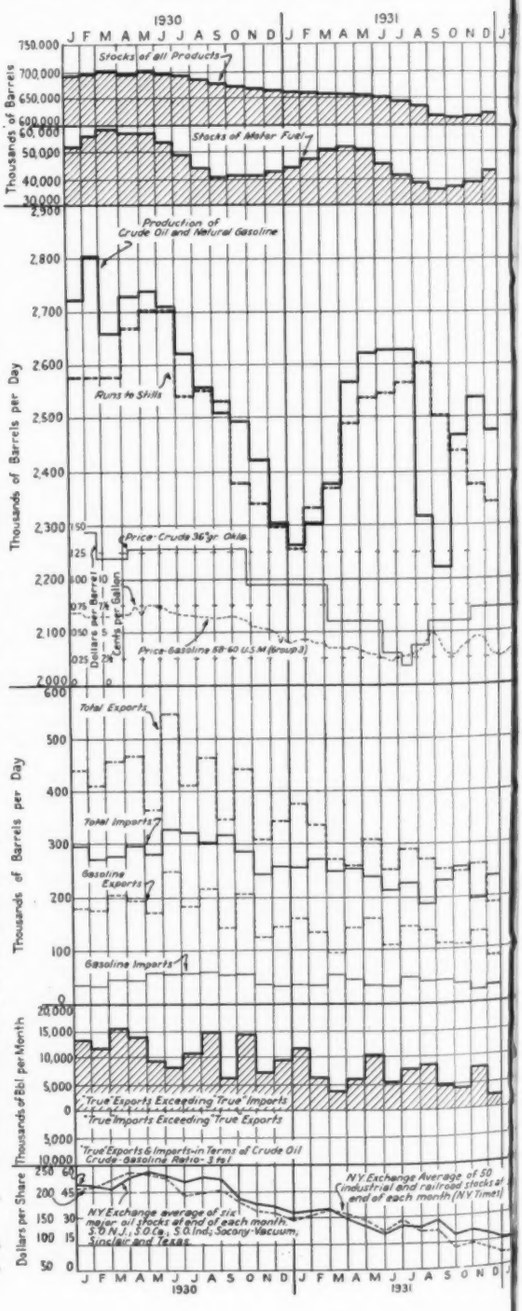
REFINERY gasoline prices fluctuated within very narrow range during the last month. Quotations at the end of February, were 2¾–3⅛ cents per gallon for 58–60 U.S.M., 57 octane rating, in group 3 (Oklahoma) market; 57 to 65 octane rating gasoline (U.S.M.) commanded 3⅜–3¾ cents per gallon and 65 and above octane rating grade was quoted at 3¾–4 cents per gallon. Coast prices for export remained without change, the 58–60 U.S.M. bringing 4½ cents per gallon.

Natural gasolines declined rather precipitately, dropping from 2¼ cents per gallon in Mid-January to 1⅜–1½ cents per gallon for grade 26–70 (former AA) at the close of February.

Crude oil prices remained without change.

Stocks—Runs to Stills

STOCKS of all petroleum products continued to increase slightly for the second consecutive month, after 17 months of steady decline. Gasoline stocks increased seasonally. Domestic consumption of motor fuel in December, 1931, increased 4.5 percent over same month of 1930, a remarkable showing under current economic conditions. Exports of motor fuel decreased 38.7 percent during the same period, resulting in a net decline in the demand for motor fuel of 1.1


1930
1931
J F M A M J J A S O N D J F M A M J J A S O N D J
Thousands of Barrels
Stocks of all Products
Stocks of Motor Fuel
Production of Crude Oil and Natural Gasoline
Runs to Stills
Thousands of Barrels per Day
Price-Crude 36° gr. Okla.
Price-Gasoline 58-60 U.S.M (Group 3)
Dollars per Barrel
Cents per Gallon
Total Exports
Total Imports
Gasoline Exports
Gasoline Imports
Thousands of Barrels per Day
"True" Exports Exceeding "True" Imports
"True" Imports Exceeding "True" Exports
"True" Exports & Imports-in Terms of Crude Oil
Crude-Gasoline Ratio-3 to 1
Thousands of Bbl. per Month
NY Exchange Average of 50 Industrial and railroad stocks at end of each month (NY Times)
NY Exchange average of six major oil stocks at end of each month S.O.N.J., S.O.Ca., S.O.Ind., Socony-Vacuum, Sinclair and Texas
Dollars per Share
J F M A M J J A S O N D J F M A M J J A S O N D
1930
1931

Statistical Position U. S. Oil Industry.

percent. Refinery runs continued excessive, in the face of accumulating stocks; moreover indications pointed to an increase in runs to stills, rather than a decrease. Eastern and Great Lakes refineries continued as main offenders, running 66.2 percent of their capacity for the week ending February 13; followed by Texas and Gulf plants which were running 64.0 percent of their capacity; while in the same week Mid-continent refineries operated at only 49.7 percent of capacity, and the California refineries at 49.9 percent.

Martial Law—East Texas

As anticipated in the previous issue of WORLD PETROLEUM the three-judge Federal Court at Houston decided on February 18 against the constitutionality of the martial law in the Constantin-Sterling case. In part the decision reads, "—that defendants . . . have been without warrant of law interfering with and illegally depriving plaintiffs of their undoubted right to operate their own properties in a prudent and reasonable way, and in accordance with the laws of the State, and that from further interference, pending the final disposition of this suit, they must be enjoined. It does not follow, however, that plaintiffs may have their injunction without terms . . . upon the condition that pending a further hearing of the controversy between the plaintiffs and the commission (Texas railroad commission) as to the right of the commission to limit their production, plaintiffs produce no more oil than that which, upon a specific and precise examination of their wells, and a finding under the statutes prohibiting waste, the commission finds the wells may produce without the waste prohibited by law."

Plaintiffs under this ruling had 15 days to draft a formal order reciting the court's opinion. Until then there would be no order of the Court. On February 23 Judge J. C. Hutcheson denied Governor Sterling's plea for 60 days additional in which to appeal the case. Meanwhile no injunction has been issued by the Federal Court and the troops remained in the East Texas field.

The Texas Railroad Commission resumed civil jurisdiction over pro-ration enforcement in the East Texas field. Allowable "per well" production remains unchanged around 75 bbl. per day, until March 15, after which the maximum allowance will be fixed at 325,000 bbl. for the field, the per well allowance to be determined each 15 days. This would indicate 72 bbl. "per well" for the second half of March, dropping to 65 bbl. by May 1. Governor Sterling stated that:—"Troops will be kept in the field to assist the Commission's authority, and I do not know how long the Commission will need or want them."

Recent decision of the Federal Court in Houston in F. C. Henderson, Inc., case sustained the validity of the natural gas conservation act, and also stated that the delegation to the Railroad Commission of power to conserve oils and gas resources was "universally recognized as reasonable, valid and appropriate." In the hearing before the Railroad Commission on February 12 in Austin evidence was submitted that the East Texas field has already suffered an average decline of about 200 lb. from the original bottom hole pressure of over 1,600 lb. while locally along the east edge of the field the pressures dropped to as low as 1,000 lb. At the current rate of production, 300,000 bbl. per day, the decline in pressure is estimated at 8 lb. per month, or at 2.0 lb. per 1,000,000 bbl. recovered, as compared with the Yates pool, southwest Texas, where the loss in bottom hole pressure is but 0.6 lb. per 1,000,000 bbl. produced. It has been argued, therefore, that current rate of recovery is an absolute maximum consistent with conservative development. It appears, though, that a lower recovery, of say 250,000 bbl. per day, or some additional means of conserving gas, which is now wasted at a rate of 90,000,000 cu. ft. per day, is imperative, if maximum recovery from the field is to be achieved.

The general impression is that regardless of any court proceedings, ways and means will be found to prevent chaotic production and ruinous exploitation in the East Texas field. The disastrous experience of five cents per barrel crude oil of last Summer is not likely to recur.

Rusk-Gregg—East Texas

VERY complicated, and ever changing, conditions continued in the East Texas field. The Sunday shut-down plan, for both wells and pipe lines, proved a failure because many wells refused to flow when re-opened, necessitating premature installation of pumping equipment, and also because many smaller operators were selling Sunday crude oil allowances to the refineries in the field at from 20 to 40 cents per barrel under the posted price, thus upsetting the price structure. Hence all major purchasers followed Magnolia Petroleum Company (Standard of New York) in changing to a seven day week, but cutting production and pipe line runs to 65 bbl. per day, instead of 75 bbl. official allowance, an effective reduction of 70 bbl. per well per week.

World Oil Production—Official Figures

All figures furnished direct to WORLD PETROLEUM by Governments, except where otherwise specified

(Figures in U. S. Barrels — Conversion ratio 7 bbl. = 1 ton)

Country	Total 1931	Daily Av. 1931	Total 1930	January 1932	January 1932 Daily Av.
United States	850,275,000†	2,329,521	898,011,000	66,884,000	2,157,548
Russia	156,342,900	428,957	129,955,417	13,059,900	421,287
Venezuela	120,069,462	528,337	141,652,832	9,939,027	320,614
Roumania	46,333,945	123,510	39,876,589	3,780,000	121,935
Persia*	45,081,096	126,942	43,549,323	3,500,000♯	112,903
Mexico	33,038,853†	90,517	39,529,914	2,869,177	92,554
Dutch East Indies	32,818,346	89,913	38,722,250	3,943,147	127,198
Colombia	18,237,190	49,965	20,343,176	1,533,969	49,483
Argentina	11,713,049	32,091	9,001,761	1,116,800	36,026
Peru	10,102,116	26,722	12,445,888	960,500	27,419
Trinidad	9,753,792	32,086	9,418,907	846,878	27,318
British India	7,830,101	21,452	6,936,315	700,000♯	22,580
Poland	4,397,760	9,146	4,645,550	351,365	11,334
Sarawak	3,338,472	12,049	5,251,441	210,784	6,799
Japan and Taiwan♯	2,342,500	6,418	2,250,000	195,000	6,290
Egypt	1,845,938	5,057	1,977,660	138,796	4,477
Ecuador	1,750,633	4,796	1,596,238	126,406	4,078
Canada	1,583,339	4,338	1,535,827	96,912	3,126
Germany (incl. Thuringia)	1,778,602	4,873	1,209,185	148,197‡	4,781
Iraq♯	1,200,000	3,290	980,000	100,000	3,226
France	512,862†	1,405	516,642	46,000♯	1,484
Sakhalin (Russian)	Incl. with Russia	Incl. with Russia	Incl. with Russia	Incl. with Russia	.....
Sakhalin (Japanese)	Incl. with Japan	Incl. with Japan	Incl. with Japan	Incl. with Japan	.....
Others♯	338,700	928	400,000	36,000	1,161
	1,360,684,656	3,727,903	1,409,805,915	110,582,858	3,567,189

1931		1930	
United States	850,275,000	United States	898,011,000
All Others	510,409,656	All Others	511,794,915

* Anglo-Persian Oil Co. Figures.
♯ Estimate.
† Revised.—France also produced 33,817 bbl. of shale oil in 1931.
‡ Production in Thuringia in January, 1931, cut down owing to a fire.

At the close of February there were in the field 4,250 wells, while locations continued at a rate of about 90 per week. For the fourth consecutive week stocks in the field were being reduced. The cumulative recovery of the field reached 123,000,000 bbl.

The cumulative recovery problem of East Texas received an unusual share of attention during January and February. The discussion began in December, 1931, when East Texas Geological Society and the Dallas Petroleum Geologists, at a joint meeting, expressed an opinion that the total recovery will be 2,100,000,000 bbl., divided as follows: 50,000 acres in the "heart of the field" considered as able to produce 30,000 bbl. per acre, or a total of 1,500,000,000 bbl., and 50,000 acres in the "remainder of the field" estimated as capable of producing 12,000 bbl. per acre, or a total of 600,000,000 bbl.

These estimates were fundamentally based on 70 ft. of sand in the "heart of the pool," on the sand porosity of 26 percent and a hoped for recovery of 40 percent, corresponding figures for the "remainder of the field" being 18½, 26 and 40. These conclusions were challenged by another group of field students, who submitted that the sand in East Texas cannot be considered as thoroughly saturated, and moreover much of the section was not sand at all, but volcanic ash, shales and silt. O. L. Brace, of the E. L. Smith Oil Company, presented an excellent summary showing that but little of the sand section is saturated.

The recovery on the basis of his detailed study is estimated at a minimum of 789,000,000 bbl. and a maximum of 1,312,500,000 bbl., with the preference for the minimum figure due to abnormally low gas volume and noneffective water drive.

WORLD PETROLEUM consistently anticipated the lower recovery figures. In March, 1931, a 1,000,000,000 bbl. cumulative estimate was given, while in September, 1931, the estimate was brought down to 800,000,000 bbl. Because, as indicated elsewhere in this month's review, the field's pressure has been declining very rapidly, and because the water level is not expected to rise gradually, but rather along bedding planes of the sand, regardless of how slowly the field is produced, the lower estimates should prove to be more nearly correct, if, indeed, they will be achieved.

BASIL B. ZAVOICO

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The customs duty on motor fuel imported into Ceylon has been increased to 15 percent, or approximately 22 cents per Imperial gallon at today's prices on the island.

U. S. Exports of Crude and Refined Products

(U. S. Dept. of Commerce Figures in Barrels of 42 U. S. Gal.)

Year 1931	Crude Oil	Gasoline	Fuel Oil Incl. Gas Oil	Other Refined Products	Total
January	1,919,000	4,903,000	2,980,000	2,208,000	12,010,000
February	1,710,000	3,606,000	2,555,000	1,831,000	9,702,000
March	1,586,000	2,946,000	2,260,000	2,035,000	8,827,000
April	1,826,000	4,187,000	2,232,000	1,745,000	9,990,000
May	2,268,000	4,992,000	2,675,000	2,170,000	12,105,000
June	2,544,000	3,265,000	2,633,000	1,855,000	10,297,000
July	2,621,000	4,473,000	2,698,000	1,964,000	11,756,000
August	2,867,000	4,210,000	2,258,000	2,245,000	11,580,000
September	2,296,000	3,355,000	2,494,000	1,967,000	10,112,000
October	2,389,000	3,461,000	2,286,000	2,310,000	10,446,000
November	2,449,000	3,743,000	2,209,000	2,116,000	10,517,000
December	1,071,000	2,691,000	1,949,000	1,462,000	7,173,000
Total	25,546,000	45,832,000	29,229,000	23,908,000	124,515,000

U. S. Imports of Crude and Refined Products

(U. S. Dept. of Commerce Figures in Barrels of 42 U. S. Gal.)

Year 1931	Crude Oil	Gasoline	Fuel Oil Incl. Gas Oil	Other Refined Products	Total
January	4,353,000	1,116,000	2,471,000	14,000	7,954,000
February	4,789,000	948,000	1,956,000	13,000	7,706,000
March	3,715,000	1,607,000	2,449,000	9,000	7,780,000
April	4,162,000	1,348,000	2,091,000	19,000	7,620,000
May	4,512,000	1,050,000	1,788,000	9,000	7,359,000
June	3,978,000	964,000	1,412,000	20,000	6,374,000
July	3,588,000	1,528,000	1,886,000	21,000	7,023,000
August	2,702,000	1,244,000	1,958,000	22,000	5,926,000
September	3,426,000	1,256,000	2,204,000	8,000	6,894,000
October	4,106,000	1,181,000	2,738,000	20,000	8,045,000
November	3,604,000	586,000	1,961,000	32,000	6,183,000
December	4,315,000	793,000	2,084,000	26,000	7,218,000
Total	47,250,000	13,621,000	24,998,000	213,000	86,082,000

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RUSSIA

Official Figures of Soviet Oil Operations

1932	Crude Production (bbl.)	Daily Average (bbl.)	Run to Stills (bbl.)	Drilling (ft.)
January	13,059,900	421,300	11,927,882	152,532

Crude Production, 1931, In Barrels *	Total	Daily Average
Quota	192,500,000	527,400
Actual	156,904,390	429,878

Revised Quota For 1932,—191,800,000 bbl., or 525,400 bbl. daily average

* Crude oil conversion ratio, seven bbl.-one ton.

Production

GROSS production of crude during the first month of 1932 not only fell short of the Plan's quota, but actually was 26,525 bbl. less daily than the average of 447,825 bbl. for December, 1931. Of the total output for January, namely 13,059,900 bbl., Azneft led with 7,334,600 bbl. and then Grozneft with 4,800,000 bbl. All other trusts aggregated 925,270 bbl. Maikop, with its comparatively small production, was the only field that did not fall behind the quota.

Severe frost set in and caused havoc in almost all oil fields. Routine of operations was dislocated, as compressed air lines and tanks were frozen and thrown out of order. Deep drilling was interrupted, frequent breakdowns could not be taken care of and repair work was difficult owing to irregularity of transportation, impassable roads, and inaccessible fields affecting the regularity of delivery of supplies. Adverse weather is not so unusual for Soviet Russia during this time of the year, so it is to be expected that the planned increase of operations will take place in regular course with the approaching spring and summer seasons.

Crude runs to stills during the month of January were 1.5 percent below the figure for December 1931, but 11 percent above the figure for January 1931. The refineries of Grozni and Tuapse, where the bulk of gasoline for export is produced, were most active during the month. Their output of gasoline and ligroin during January amounted to about 2,000,000 bbl., which was 101 percent of the plan for the month. Cracking operations of Grozni were likewise very satisfactory with operations exceeding the plan by 8 percent.

Wildcatting Difficulties

A SURVEY made of the activities in exploration of new oil regions and new

locations in the old oil regions shows that all oil trusts of Soviet Russia are experiencing difficulties in their operations, mostly due to the usual lack of transportation facilities and shortage of supplies. All oil trusts of Soviet Russia are complaining of low qualification of the rotary drilling teams. This naturally affects drilling efficiency. It has been found also that the managing personnel of the drilling teams is in most instances not fit to manage owing to insufficient training and education.

In face of all difficulties new locations were recently discovered by Azneft in Baku at the regions of Kala, Kerges and Neftechala where a number of testing wells were drilled and have proved of a promising nature. At Neftechala iodine has been found and new discoveries were made at Naftalan where the oil possesses unique medicinal qualities.

In contrast to the Azneft Oil Trust's operations all exploration done during 1931 in the fields of Grozni has proven of no avail. Most of the drilling had been directed in the region of Benoi, which is 150 kilometers from Grozni. In this region oil has been discovered at Srech-Kertichki. The discovery well was a gusher, and came in at about 3,400 ft.; but it could not be operated owing to lost tools, requiring a rather complicated and unsuccessful fishing job, and the well had to be abandoned. New drilling will not be done before spring when the fields will be accessible. Another well drilled in the same location yielded oil that is different from all other grades of Russian oil. It contains a large quantity of paraffin, some part of which crystallizes freely at a normal temperature. This shows that the oil contains practically no tar. The pour point of this oil is 6.5 deg. C. and in all other qualifications this oil resembles Davenport, Oklahoma crude.

Drilling Regulator

An engineer of the Azneft has recently invented an automatic drilling regulator which is said to prevent deviation of drilling. It regulates the straightness of the well, increases the drilling speed, prevents in a large measure wear and tear on drilling equipment, and allows the bit to remain for longer periods under surface at faster drilling speed. Crookedness of a well at a depth of 1,500 ft. often causes a well to be abandoned, owing to the time needed for its correction. The new regulator is said to enable the rectification of a crooked well at such or even greater depths to be completed in a few days, and then to prevent any further deviation. About 25 such drilling regulators were tested by Azneft and gave satisfactory service: 150 automatic drilling regulators are at present being manufactured at the Baku machine shops, and will be introduced shortly in all Russian oil fields:

Azneft Reorganizes

Azneft Oil Trust of Baku has undergone recently a reorganization in the form of a decentralization of the various divisions. Its 22 oil fields have been decentralized and grouped as follows:

(1.) Lenin group, which embraces the Balakhani, Ramani and Sabunchi fields.
(2.) Ordzonikidze group, which embraces the entire Surakhani region.
(3.) Stalin group, which embraces the Bibi Eibat and Bukhta (Bay) fields.
(4.) Kiroff group, which embraces the Bingadi fields.
(5.) Karachukur group of fields.
(6.) Puta—Shubani group of fields.
(7.) The group of fields on Artem island.
(8.) Neftechala group of fields.

Each of these groups of fields will have an individual and independent department of production, which may be subdivided shortly into separate organizations to take care of the individual fields. Azneft in future will maintain the following individual departments which will be conducted separately from one another:

Drilling Department — Electromechanical Shops
Geological Bureau — Building Department
Transport Office — Insulation Office
Communal Center

A similar grouping has been undertaken in regard to Azneft's refineries at Baku. These will in the future be known as:

Piatakoff plants — Budienni plants
Dshaparidze plants — Cracking plants
October Revolution Plants

The plants at Batum together with the Frunse plants and the sulphuric acid installation have been reorganized under one unit and placed on a commercial basis in order to pay their own way. All other auxiliary organizations such as the Supply Bureau, and Bureaus of Pipelines, Highways, Railroads, etc., have also become independent units and placed on a commercial basis in order to pay each their own way. It is to be expected that about 25–30 percent of the employees of the various organizations of the Azneft will be discharged and placed elsewhere in order to curtail expenses and to reduce materially overhead. It is also to be expected that in future all managing and engineering jobs will be placed in the hands of trained and responsible men.

Cracking

At present there are 24 cracking units in operation in Soviet Russia with a total capacity of 18,250,000 bbl. per annum. Fourteen more cracking units are expected to be put into operation during 1932. The throughput capacity of all cracking units at the end of 1932 thus will amount to 29,000,000 bbl. The ratio of cracked gasoline to the total gasoline produced in 1932 will be 20 percent. (The ratio of 1931 was 13 percent.) At the end of 1932 Russia is expected to be in a position to produce 20,000,000 bbl. of cracked gasoline per annum.

Refining

Total refining capacity of all plants of Soviet Russia including cracking units was expected at the beginning of 1932 to be 195,000,000 bbl. of crude provided all the plants which were under construction in 1931 were completed at the end of the year. A further increase of refining capacity was to be expected during 1932 and 1933 of about 96,000,000 bbl. of crude. Included in the number of refineries to be built during 1932 are lubeoil pipe stills of 3,500,000 bbl. total capacity, while all existing lubeoil shell stills will be reconstructed and enlarged to a capacity of 1,750,000 bbl. Most of this building will be done by domestic design and construction of equipment.

All these installations are expected to be completed and put into operation during 1932.

Various reasons and causes have been hampering the reconstruction of the refining division of the industry. Much has been done, however, to improve methods of straight distillation and introduction of cracking has increased considerably yield of white products from crude oil. Yield of gasoline and kerosene has been increased from 2.7 percent in 1913 to 13 percent in 1931. Runs to stills were increased from 64 percent of total production in 1913 to 87.5 percent at the end of 1930.

Second 5-Year Plan

Following survey has been presented by the Petroleum Research Institute of Soviet Russia in connection with the Second Five-Year Plan of the Oil Industry. The Second Five-Year Plan will commence in 1933 and terminate in 1937 when crude production of all oil fields of Russia are to reach the ambitious figure of 630,000,000 bbl. Successful achievement of the plan will depend largely upon skillful reconstruction of the industry to the point of overcoming technical difficulties in all phases of operation.

Geological survey and exploration of new locations will have to be increased mainly in the eastern regions of the country such as the Ural, Emba, Sakhalin, Wolga district, Middleasia, etc. Exploration drilling requires a radical change of methods employed and its practice. The three-stage system, which only allows practical exploitation during the third year if the previous two years have shown

positive indications, will be eliminated and commercial drilling will be introduced immediately. Air photography will be adopted in the exploration for oil and geophysical, and electrical methods will be introduced on a large scale, together with motor and air service for the transportation of supplies.

In exploitation drilling superdepths of 7,500 to 13,000 ft. will be tried.

Depths over 10,000 ft. are exceptional even for U. S. A. where deep drilling has been made possible through the application of powerful rotary drilling equipment, increased capacity of power drives, heavier machinery and by high-quality alloys used for welding drilling bits. In Russia deep drilling will be done by the Kapelushnikoff turbo drill, which entirely eliminates the rotation of the system of pipes, and simplifies drilling by centralizing drilling power at the bit at the bottom of the hole.

The production division will rationalize all methods of operation and will eliminate all possible waste such as is confronted through evaporation in the exploitation of the subsoil resources of oil and gas. Absorption plants will be installed in all fields and connected directly with the wells; and pipe lines will connect the gas-wells with industrial centers and cities. Extensive systems of gas lift will be employed in order to exploit resources to the greatest advantage.

The refining end of the industry will face the task of attaining exceptionally high yields of motor fuel, lubeoil and other products from crude. There will be a complete reconstruction of the refineries and the introduction of the most progressive pipe still installations to enable the maximum yield of white products from the crude. Cracking will be further developed along the lines of vapor phase.

In treating petroleum products sulphuric acid will be replaced by bleaching earth, and by methods of catalysis which have been successfully tested by the Petroleum Research Institute.

Hydrogenation will be introduced. The method of hydrogenation will be combined with various methods of straight distillation of petroleum and with cracking. Cracking in vapor phase will be combined with liquid phase cracking. Refining oil in other industrial systems will be studied in order to combine the petroleum industry with the chemical industry for the purpose of regulating the geographical location of refineries.

Testing plants will be erected together with research laboratories in order to commercialize all experimenting of the laboratories. All machine plants which are building equipment for the oil industry will be enlarged, and equipped to build all kinds of high quality equipment so as to free the oil industry from the necessity of importing equipment. It is expected that the Second Five-Year Plan will bring Soviet Russia nearer to its aim to "reach and surpass" the United States.

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THE oil discovery at Chussoff Village in the Urals, which was heralded as Russia's oil resource of the future, has yielded between July 1928, the time of its discovery, to date but 75,000 bbl. of crude oil.

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THE Geologic Survey Service of the Azneft states that it has discovered large oil deposits in the region of the Transcaucasian Railroad between Puta and Eibat.

J. WEGRIN.

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Soviet Refining Industry—Plants Completed During 1931

District	Units	Annual Capacity (Barrels)
Baku—	One 9-battery shell still	2,800,000
"	Two Winkler Koch cracking units	2,100,000
"	One Shukoff-Kapelushnikoff cracking unit	210,000
"	One Pengu Gurevitch high-vacuum pipe still	280,000
"	One Sulphuric acid regeneration plant	5,000 (tons)
Batum—	One Winkler Koch cracking unit	1,050,000
"	Three Foster Wheeler kerosene pipe stills	8,400,000
"	One Foster Wheeler vacuum pipe still	1,400,000
Grozni—	Four Winkler Koch cracking units	4,200,000
	Plants under Erection in 1931, but Still Uncompleted	
Baku—	Two Graver pipe still, domestic construction	5,600,000
"	One Max Miller bright stock installation	280,000
Grozni—	One Badger kerosene pipe still	7,000,000
"	One Extension of paraffin plant	16,600 (tons)
"	One pipe line extension, Grozni-Tuapse	12,600,000
"	One Extension of electrical power plant	25,000 (k.w.)
Maikop—	One Pumping Station on River Tukha	12,500,000
"	One Turbo-generating power plant	2,300 (k.w.)
Krasnodar—	Three Carbon black installations	2,500
"	One Refinery	2,700,000
Armavir—	One Refinery	12,600,000

CANADA

Imports

IMPORTS of crude during December showed a heavy decline from those of November being 1,766,850 bbl. compared with 2,661,188 bbl. in the previous month. Gasoline imports reached the low figure of 109,927 bbl. which was a heavy decrease from the previous month when importations reached 262,832 bbl. The continued downward trend of gasoline imports is shown very clearly in the figures covering 1930 and 1931 for the last four months in each year.

Canadian Gasoline Imports

	1931	1930
September	265,380	606,317
October	222,218	476,845
November	262,832	144,193
December	109,927	184,174

Note. November was characterized by a large importation from Dutch West Indies totalling 160,077 bbl.

Finance

CONTINUED open weather during the autumn and winter has been reflected in gasoline sales which maintain a high level. Oil companies report a good year during 1931. British American Oil Company, Ltd., earned well over its dividend requirements. Gross profits for the year amounted to $4,415,745. After allowing $1,684,815 for debenture interest, depreciation, and income tax, compared with $1,463,181 a year ago, there remained a net profit of $2,730,930 compared with $2,648,034 at the end of 1930. This is equivalent to $1.04 a share as against $1.01 a year ago. After deducting dividends, amounting to $2,098,113, the surplus for the year carried forward amounted to $632,816 compared with $549,920 in 1930.

Price Investigation

THE petroleum industry in Canada is seriously threatened with Governmental interference from several sources. Increased taxation on gasoline is mooted in certain provinces, and a considerable amount of speculation is being indulged in as to how far taxation can be carried in this direction before resulting in serious decreases in consumption, which would entail extra hardship for oil companies without increasing the Government's revenue from this source. Impartial observers are

inclined to the opinion that the danger line has been reached with the taxes at present in force; that any increases at the present time will only defeat the ends they seek to attain. The Dominion Government has acquiesed to the demand for an investigation into gasoline prices. Demand for this has been insistent from all parts of the country—but particularly from the west—for some time. The resolution demanding the enquiry was brought forward in the House of Commons by Dr. Thomas Donnelly, who gave a long list of comparative prices in the United States and Canada to support his demand. He also brought out the fact that an Order in Council had been passed placing the value of imported gasoline for duty assessment purposes at a higher figure than the wholesale price in the United States. Premier Bennett in reply pledged the entire support of the Government in the matter, and he promised the investigating Commission the benefit of technical advice. He also read letters from the leading oil companies offering to cooperate to the fullest extent with any competent investigatory commission. He drew attention to the fact that raw materials used in the oil industries were not produced in Canada, and that, therefore, price comparisons with those existing in the United States were apt to be unsafe.

The possibilities, however, of investigations spreading beyond the Federal field are shown by dispatches from Regina, which indicate that the Government of the province of Saskatchewan may order an inquiry into gasoline prices. It will be remembered that we have previously referred to this danger, and it is obvious that Provincial investigations would only result in duplication and needless expense to the public purse, and to the oil companies involved.

R. C. ROWE

Construction

AN 800 bbl. Leamon cracking unit is being installed at the plant of the Northwest Stellarene Company, Coutts, Alberta, formerly the Beaver Refining Company. The equipment for this full flashing unit will include hot oil pumps, new reaction chamber, flash chamber and heat exchanger equipment. The Kevin-Sunburst field of Montana has been considered as the basis of crude supply.

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MEXICO

Exploitation Prohibited

ISSUANCE of permits for the exploitation of petroleum lands in any part of Mexico has been suspended until further notice by a special decree enacted by President Pascual Ortiz Rubio. The only official explanation of the action is that it is "for the good of the public". The decree orders the Ministry of Industry, Commerce and Labor to examine all existing petroleum lands exploitation permits in order to make recommendations for a fixed basis upon which future permits may be granted. The decree, however, does not affect production or exploitation for which sanction has been allowed.

1931 Review

ALTHOUGH Mexico's 1931 petroleum production was but 33,031,081 bbl. a decrease of 6,491,048 bbl. from that of the previous year, the Republic continued to hold sixth place among oil producing countries of the world, according to a review covering activities in the Mexican industry during last year issued by the petroleum department of the Ministry of Industry, Commerce and Labor. The worth of last year's oil production was approximately $35,500,000, U. S. With the 1931 output, which was the lowest since 1915, Mexico's petroleum production from 1901, the year when oil was first commercially exploited in this country, to December last, was 1,632,455,682 bbl. worth commercially some $1,400,000,000, U. S.

While admitting that the drop in petroleum production last year was serious, the department contends that the reduction was simply a reflection of the depression the oil industry is experiencing throughout the world. The department asserts that this, like all other petroleum producing countries, has opportunely effected measures for the conservation of petroleum resources and for rational and unitary exploitation.

Exports

MEXICO'S exportations of petroleum and its by-products last year totaled 22,503,233 bbl. of which 22,490,924 bbl. were nationally produced and the balance was of foreign origin. Exportation was 4,468,105 bbl. lower than 1930 sales abroad. Of the 1931 exports, 43 percent went to the United States, and the balance to other American countries, and to Europe, Asia, Africa and Oceania. The review makes special mention of the fact that Mexican heavy petroleum was in much demand abroad last year, chiefly in eastern United States where it was used for the manufacture of asphalt and fuel oil. The department looks to the development of domestic consumption, however, as a means of improving the national oil industry.

Exploration

AUTHORIZATIONS for drilling wells were fewer last year than in 1930. Permits of this sort in 1931 were 138 against 179 granted during 1930.

During the year, 57 producing wells were brought in. These had a total initial daily production of 58,944 bbl. and a combined daily average output of 1,031 bbl. These wells are distributed in the following zones:

Tonala (Isthmus of Tehuantepec), 25; Paso Real (Vera Cruz state), 13; El Burro (Tehuantepec), 8; El Plan (Tehuantepec), 5; Altamira (Tamaulipas state), 3; and one each in Mier (Tamaulipas); Tanhuijo (Vera Cruz), and Panuco (Vera Cruz).

The year witnessed the opening up of two new oil fields—El Burro and El Plan. The former field is one kilometer south of the great Tonala area in the Isthmus of Tehuantepec, and the latter two kilometers west of the Tancochapa River, on the borders of Vera Cruz and Tabasco States, in the north region of the Isthmus. At the end of the year, the El Burro field covered 800 sq. mtrs. and the El Plan area, 700 sq. mtrs.

Discovery of important gas and petroleum indications in northeastern Mexico are considered a feature of the past year's oil activities. During that period a well was brought in in the Mier field, in the northern part of Tamaulipas state, that had a daily output of 7,000,000 cu. ft.

Exploration was pushed in the northeastern portions of the Republic, and geologists declare prospects there are excellent. In that region, 69 test wells were sunk during the year, at depths ranging

from 47 to 499 meters. In the northeastern area of the Isthmus of Tehuantepec, 200 test wells were drilled during 1931. Most of these were shallow, with depths of not more than 50 meters each. Other centers of activities during the year were in zones along the Panuco and Tamesi Rivers, south of the Tuxpan River and in Tabasco and Chiapas States.

Increasing Consumption

IMPORTANCE is attached to the fact that last year 253,066, 739 liters of gasoline were consumed in the country, indicating increased industrial development and popularity of automobiles. Gasoline consumption in 1925 was 141,294,668 liters.

A contract which officials of the Mexican Eagle Oil Company (Royal Dutch Shell group) admit their company has made with the National Railways of Mexico to supply the rail system with 3,000,000 bbl. of oil for locomotive and other fuel purposes, is seen by some oil men as a death blow to the National Petroleum Administrative Control, a Federal Government oil agency. The company had a contract with the railway to supply 300,000 bbl. of oil monthly at the reported rate of 50 cents, U. S. per barrel. It is reported that the railway gave the Mexican Eagle Oil Company the contract because their bid was 35 cents, per barrel. Oil company officials declare this rate is inexact, but decline to make public the contract price.

Mexican Eagle Oil Company will be in an excellent position to supply the required crude from its Mexico City refinery which is now receiving 1500 cu. meters of crude per day direct from the great Tampico field via the pipeline—highest in the world—which was reviewed in the February issue of WORLD PETROLEUM.

Inauguration of this highly important pipeline occurred on February 19, witnessed by a few company officials. Previously official Government inspectors had approved the construction and directly following successful inauguration of the service all seven pumping stations reported the line functioning perfectly.

Six days later, however, the line broke or was cut at Azcapotzalco. Fire broke out as the escaping flood of oil became ignited. The accident, which is being investigated is most unfortunate considering the difficulties which were overcome in constructing this remarkable line.

Late advices indicate that the line was dynamited, as a second explosion occurred on March 4 with definite indications of a deliberate attempt to destroy the pipeline.

Taxation

ALL products similar to gasoline will be considered as that commodity for the purposes of taxation and are subject to the Federal levy of four centavos (about 4 cents, U. S.), the Ministry of Finance has ruled. Under this classification are grouped: gasoline, pure, or mixed with various light petroleum products, and light petroleum products, reds, colorless, or lightly colored.

Mexico City district courts have rejected applications by the Huasteca Petroleum Company (Standard Oil of Indiana) for injunctions against the Federal authorities and the Governments of some States effecting the law recently passed by the National Legislature providing that the commonwealths may collect two centavos of the six centavo (about 2.5 cents U. S.) per liter tax on gasoline. Company contended that the Federal Legislature has no right to enact measures for the States, and because of that this law is unconstitutional.

Refinery to be Constructed

MEXICAN interests headed by Enrique Resendiz have been granted a concession by the Tamaulipas State Government for the establishment of a petroleum refinery in Nuevo Laredo, that State, across the border from Laredo, Tex. Concession calls for the plant to refine petroleum and all its by-products such as oils, greases, lubricants, gasoline, naphtha, kerosene, gas oil, fuel oil and Diesel oil, and to fabricate such medicinal articles as oils, vaselines and parafines. The interests must give preference to Mexican materials and start work on the plant within six months from January 22. They have been granted the special privilege of annual State taxes of not more than $20. The amount of capital and how much the promoters propose to spend is as yet unknown; the concession, however, demands that the investment be not less than $16,000 and it is generally expected that the investment will be considerably larger.

DOUGLAS GRAHAME.

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FRENCH PETROLEUM IMPORTS 1931

(Barrels of 42 U. S. Gallons)

	Crude Oil	Gasoline	Kerosene	Lube Oil	Gas Oil	Fuel Oil	Total
Germany	13	18,132	4,265	24,496	4,009	.....	50,915
Algeria	.....	.....	.....	539	.....	.....	539
Colombia	195,439	966	.....	.....	.....	.....	196,405
Luxemburg	4	243,709	11,893	36,204	10,865	4,820	307,495
Egypt	.....	114,429	30,417	.....	.....	.....	144,846
United States	442,374	7,468,629	680,254	1,292,880	145,233	164,540	10,193,910
England	.....	8,786	2,043	21,476	.....	.....	32,305
Dutch E. Indies	.....	223,828	17,724	.....	10,995	7,686	260,233
Mexico	8,055	107,994	55,520	291	.....	.....	171,860
Holland	.....	299	.....	5,851	1,319	.....	7,469
Persia	1,398,967	3,925,385	298,474	611	28,777	743,166	6,395,380
Poland	.....	13,816	17,137	24,998	25,476	.....	81,427
Haiti	.....	362	.....	.....	.....	.....	362
Dutch W. Indies	.....	56,821	2,515	.....	147,502	580,709	787,547
Roumania	1,546	2,397,374	354,009	3,054	796,092	247,118	3,799,193
Russia	.....	3,581,228	10,030	196,903	216,125	835,840	4,840,126
Venezuela	1,425,250	380,022	993	21,303	532,228	1,507,171	3,866,967
Switzerland	.....	12,559	.....	.....	4,122	.....	16,681
Panama	.....	.....	.....	856	.....	13,921	14,777
Brit. W. Indies	.....	.....	.....	.....	.....	23,485	23,485
Others	158,267	21,100	12,438	16,071	9,072	8,170	225,118
Total	3,629,915	18,575,439[1]	1,497,712	1,645,533	1,931,815	4,136,626	31,417,040

[1] Figures for gasoline imports include both high and low grade gasoline. Total high grade amounted to 15,507,828 bbl.

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STEAUA Romana in the fiscal year 1930–1931 drilled 1,003,266 ft. in Roumania, compared with 1,704,682 ft. during the previous 12 months, and produced 6,104,947 bbl. and 6,333,796 bbl. of crude respectively. The company also purchased 2,900,646 bbl. from small independent producers. It exported a total of 6,718,656 bbl.* of crude and products, an increase of 47 percent over the previous year.

*Converted from tons at ratio of 7 bbl. per ton.

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COLON Oil Corporation's subsidiary in Venezuela, reports that a new well has been brought-in in the Las Manueles field producing at the rate of 3,100 bbl. per day through a ¾ in. flow-plug, with a casing pressure of 1,400 lb. and tubing pressure of 600 lb.

SHIPPING

London: March.

CONSIDERABLE interest has been shown among shipping men in London in John I. Jacob's tanker chartering review for the second half of 1931. Their opening paragraph is optimistic; but perhaps the wish may be father to the thought. As usual in these cases, owners are urged to take a philosophic view and to expect better times in the future.

With regard to the charter market at the beginning of this year, it may be said that in February a certain amount of fixing has been concluded, one of note being that of a large tanker from two ports, Black Sea to three ports Cape Town, Durban Range at 12/3d with clean oils. The bulk of business concluded, however, has been for small tonnage or for space in large tankers. It is pointed out that notwithstanding the more general character of the inquiries, freight rates have shown little, if any, improvement. The clean oil market is particularly quiet at the moment, most of the cargoes which have been arranged being those from Black Sea to European ports. The time charter market remains devoid of inquiry.

Late advices indicate that the demand for dark oil tonnage from California to Japan still continues, but that the bulk of this inquiry has now been filled on the basis of about 27 cents. With the exception of this Japanese inquiry the market generally remains dull. There has been an inquiry in connection with Japanese affairs in the Far East for a vessel for 12 months time charter commencing late Spring, but it is understood that no arrangements have yet been concluded.

Tanker Repair Work

BRITISH shipbuilding trade unions and the Shipbuilding Employers' Federation held a conference recently to discuss issues arising out of questions raised by North East Coast employers. This group has engaged largely in tanker repair work of late. Employers have attempted to secure the agreement of local unions to investigate the problem of working conditions, with a view to improving the competitive ability of the district. As in so many discussions of this nature, no definite agreement was reached.

One of the most important repair jobs to tankers carried out on the North East Coast for some time is that on the Hunting tanker WELLFIELD. This ship was reported some time ago ashore on the Bosphorus. She was loaded at the time with benzine and was expected to become a total loss. After having been abandoned in severe weather it was decided later to commence salvage operations on her. Temporary repairs were carried out on the spot and she later sailed for home in charge of a tug reaching North Shields, on the Tyne, quite safely. Repair work on this tanker included the removal and renewal of nearly 190 plates while as many as 70 had to be removed, repaired and replaced. It was decided when the repairs were put in hand that an additional tank should be put into the vessel amidships, thereby increasing the capacity by 38,000 cu. ft. At the same time the engines were reconditioned and partly reconstructed, after which a higher mean speed was realized.

The WELLFIELD was actually ordered in 1919, but construction was delayed during the post-war slump and the vessel was not handed over until early in 1924. At the time of her accident she had over seven years satisfactory service to her credit. She was originally designed to carry about 7800 tons of oil. Whether it is a wise procedure to increase the carrying capacity of tankers is a point which might be debated, particularly in view of the fact that if the freeboard regulations are ratified this year the carrying capacity of all tankers will be automatically increased. Doubtless, however, the WELLFIELD'S owners were looking to the future and hoping that freight markets would eventually recover.

Tankers Recently Launched and Completed

Name	Owner	Tonnage	Remarks
ALVINA	Anglo-Saxon Pet. Co. Ltd. for N. V. Petroleum Maats. "La Corona", The Hague	11,800 Dw.	Trial trip Jan. 12
AMURA	Anglo-Saxon Co. Ltd.	11,800 Dw.	Trial trip Jan. 13
ELLFIELD (reconditioned)	Hunting & Son Ltd., Newcastle	12,100 Displ.	Trial trip run
L. HAGUE	Standard Shipping Co. New York	16,000 Dw.	Launch Feb.

New Construction

RUMOR is still strong in the City of London concerning the 2000 ton ship which has been commented on in these columns before. Meantime the only new constructional work that it is possible to record is an order for a 2800 tonner which the Furness Shipbuilding Company of Haverton Hill on Tees have just received from Canadian owners. She is not for the Imperial Oil Company (for whom the Furness Shipbuilding Company has built similar ships during the past few years), as believed in England, but is for the British American Oil Company of Toronto and forms the second ship purchased by the B. A. O. from the Furness yard These are special types of tankers capable of navigating through the canals, the only type for which a specific demand exists that are likely to be ordered in the next few months.

With the charter market as it is there can be no sudden demand for tramp tonnage and little inducement to builders to place contracts. There have been one or two cases recently of existing steam tankers returning to port on the expiration of charters, and their place being taken by more modern motor tramp tankers, which have been laid up since construction. Some of these tramp tankers have been tied up for a very considerable period as for example the Andrew Weir CORABANK which was completed early last year and which has never yet gone to sea except on a trial trip.

Ship Sales

STANDARD Transportation Company of Hong Kong has sold its 7240 tonner built in 1913 for breaking up at Shanghai. This vessel was owned and operated from Hongkong. The motor tanker LOS ALAMOS, a 5000 tonner built in Baltimore in 1916 and owned by the Standard Vacuum Transportation Company of New York has been sold to the Sabine Transportation Co., Port Arthur, Tex.

A. C. HARDY.

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OUR cover illustration this month is a view of the debutanizing and stabilizing towers at the Standard Oil Company of New Jersey's Bayway refinery.

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A contract for the purchase of 170,000 bbl. of gasoline and 80,000 bbl. of kerosene from the Soviets by the Uruguay Oil Monopoly is awaiting signature, pending an investigation of the Iuyamtorg, the Government trading company in Uruguay.

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Owing to curtailments in production by the Tropical Oil Company and the Andian National Corporation (subsidiaries of the International Petroleum Company), aggregate payment of oil royalties to the Colombian Government during 1931 dropped to $761,000 compared with $1,186,662 the previous year.

Foreign Oil Legion

Sir Edward Mountain, chairman of the B.O.D. Company, Limited, and Admiral Lord Wester Wemyss, a director, have returned to England from Iraq, where they have been negotiating the company's new oil concession.

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Captain T. S. Masterson, a director of Phoenix Oil and Transport Company, has returned to Roumania from London.

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W. H. Howe, president of the National Lubricating Oil and Grease Federation, and a director of W. H. Willcox and Company, has returned to England from a three-months tour in South America.

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Mons. Dentz has been appointed general secretary of the Federation Française des Carburants, Paris, to fill the vacancy caused by the recent death of Charles Demontfaucon. Mons. Dentz has had considerable experience in the oil industry including Poland, where he was with the Société des Petroles Premier organization.

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E. H. Tramell, representative at Maracaibo, Venezuela, of the Oil Well Supply Company, is at present in the United States on a combined business and vacation trip.

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R. W. F. Newton, who constructed the Aguila refinery at Aruba and who, until recently, was in charge of building the Aguila's new Mexico City refinery, has been transferred back to the Aruba plant. We understand that he accomplished some excellent work on both these refineries, and in record time.

Frederick S. Fales, the new president of the Standard Oil Company of N. Y.
Blank & Stoller

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Pierre Dessus, general secretary of the Standard Franco-Américaine, was recently made a Chevalier of the Legion of Honour.

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Christian Good, formerly administrator of the S.A. Quervel Freres (manufacturers and distributors of lubricating oils), was offered and has accepted the post of Administrator on the Board of Directors of the S.A. Des Huiles Antar.

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Professor Jung of the University of Strasburg's oil section has been appointed by the governor general of French Equatorial Africa to take charge of the mission, which is to undertake research work for oil at Pointe-Noir and at Farnan-Vaz. It is said that several wells will be drilled when the geological survey of the country is terminated.

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Henri Roy has been appointed president of the Board of Directors of the Office National des Combustibles Liquides in the place of Louis Loucheur. Mons. Farjon and Charles Baron, senators, have been made vice-presidents.

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Ralph E. Fair, one of the leading drilling contractors in Europe arrived in New York on the morning of February 16th and sailed for Europe the same night. Mr. Fair, whose home is in Ploesti, Roumania, is a partner of the Lucey Petroleum Corporation of East Texas and is also the representative of the Oil Well Supply Company in Roumania.

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Dr. V. Henny, European representative of the Universal Oil Products, sailed from New York, February 19, for Europe on the SS. Bremen.

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Waldo Sheldon, president, Shelden Machinery Corporation has been in Mexico watching the operation of a Diesel drilling rig on a wildcat.

Blank & Stoller

T. S. Cooke, vice-president in charge of refining operations in the United States and abroad of the Pan-American Petroleum and Transport Company.

William Green, vice-president of the Pan American Petroleum and Transport Company, has been visiting Tampico, Mexico, for the reported purpose of superintending the inauguration of the refinery that the Huasteca Petroleum Co., of the Pan American group, has established in Mata Redonda, Vera Cruz State. This plant, it is understood, will afford the Huasteca further means of meeting competition of the Mexican Eagle Oil Company, which has completed its pipeline from Palma Sola, Vera Cruz State, to Mexico City.—See pages 36–38, January 1932, World Petroleum.

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J. J. McGrath, well known oil man of Olean, N. Y., who had spent several years in France and Burmah, was mysteriously shot and killed in Longview, Texas, early in February.

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W. H. Collins, division chief production engineer for the Shell organization at Tulsa, Oklahoma, is now in The Hague at the headquarters of the Royal Dutch Petroleum Company, and is not expected to return to the United States for several months.

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George Walden, general manager of the Dutch East Indian operations of the Standard Oil Company of New Jersey is due in New York some time during April.

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James Robertson, Vacuum Oil Company, Inc., Shanghai, is back in China following a visit to New York.

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Ernst Michaelsen, who is in charge of the Scandinavian operations of the Vacuum Oil interests, has returned to Copenhagen from the United States.

FINANCE

New York—February

ANNOUNCEMENT from Washington of the contemplated legislation (the Glass-Steagall bill) to broaden the credit base of the Federal Reserve system so as to increase substantially the country's free gold formed another link in the chain of relief measures sponsored by the administration for the purpose of easing the credit crisis and arresting the deflationary momentum of the depression. The security markets responded with a sharp upturn, which culminated with respect to stocks during the third week of February and then yielded to reaction of technical proportions over the balance of the month. Strength in the bond market, however, was well maintained in response to lowering of the New York rediscount rate to three percent, indicating easy money policy of the Reserve Banks as part of the program to turn the tide of the depression toward recovery. Although business has shown little definite improvement since the first of the year, it is increasingly apparent that a better feeling is beginning to permeate the economic structure, and the spring months are being hopefully anticipated.

The oil industry is waging successful combat against overproduction of crude and despite legal uncertainties in East Texas is unlikely to see its hard-won control overthrown. Gasoline stocks have been mounting, but whether dangerously so is open to argument since even if domestic demand holds equal to a year ago exports will unquestionably continue their downward trend. On the whole, however, the industry has reason to face the spring season with hope and confidence, and appears to be so doing.

UNION Oil Company of California reported for 1931 a net profit of $3,054,913, equal to 70 cents a share on 4,386,070 shares of $25 par capital stock, compared with 1930 net of $9,604,997, equal to $2.19 a share. In 1931, however, unrealized inventory loss amounting to $7,210,062 was charged to surplus, and if this item had been deducted from earnings (as is the more usual method of treatment) a deficit of about 95 cents a share would have been shown. At the close of last year current assets were $52,634,790, and current liabilities totaled $4,959,342, indicating maintenance of a very strong financial position since cash and marketable securities alone were nearly four times current liabilities. Retirement of obligations on funded debt during 1932 amounts to $1,100,000 and maturing purchase money obligations to $1,300,000, suggesting that there are no financial difficulties in store for the company for at least another year. The earliest bond maturity to be met falls in 1935.

SEABOARD Oil Company of Delaware, whose most important operations are now centered in California, is expected to report 1931 profits of over $100,000, equal to about eight cents a share. Even though this figure will include deduction of a non-recurring item of about $300,000, it indicates a substantial decline from 1930 when 48 cents a share was shown. A new arrangement regarding Seaboard's Mexican properties was effected late last year, when Mexican Eagle Oil Company (Royal Dutch-Shell) took over operations on a per barrel basis, purchasing the oil as produced. Certain non-producing properties were also turned over on an over-riding royalty basis with specified obligations to drill. This change has made for substantial reduction in Seaboard's overhead and operating expense in Mexico. Financial position as of December 31 was strong, current assets of over $2,000,000 being 10 times current liabilities and consisting almost entirely of cash and marketable securities.

BRITISH-AMERICAN Oil Company, Ltd., engaged in transportation, refining and distribution in five Canadian provinces and in crude production in the mid-continent section of this county, earned $2,730,930 last year, compared with $2,648,034 in 1930. On a per share basis $1.04 was shown against $1.01, both figures based on 2,622,642 shares. These excellent earnings were achieved despite decrease in dollar volume of sales through use of added facilities and substantial economies in all departments. It may be commented, however, that the Canadian oil companies were generally better situated last year than the American companies because of the Canadian tariff on gasoline which allowed entry of cheap crude but prevented dumping of excess gasoline from this or other countries. Due to capital expenditures financed by bank loans last year, financial position on December 31 was not particularly strong, with current assets of $9,205,594, less than 1.5 times current liabilities of $6,378,136. No major expenditures are planned for this year and cash earnings will be devoted to retirement of bank loans and to continuing, if possible, the current dividend rate of 80 cents per share per annum.

IT is reported that dollar volume of sales of Imperial Oil, Ltd. (Canada), was down approximately 10 percent last year while gallonage sales of lubricating oils and gasoline showed practically no change.

New York Stock Prices

1932 High	1932 Low	Current Div. $ per Annum	Stock (Par Value $)	Sales (Shares)	January 25 to February 27 First	High	Low	Last	Net Change[1]
10⅞	8⅝	1.00	Atlantic Refining (25)	34,500	9⅞	10⅞	8⅝	10⅛	+ ¼
5⅞	4	....	Barnsdall 'A' (25)	36,500	4½	5⅜	4⅛	4¾	+ ¼
⅝	⅜	....	Colon Oil (No)	4,000	½	½	⅜	½	— ⅛
6⅞	5⅝	....	Continental Oil (No)	75,500	6¼	6⅝	5⅝	6	— ¼
2¼	1¾	....	Creole Petroleum (No)	23,900	2	2¼	2	2⅛	+ ⅛
32	25⅜	1.50	Gulf Oil Corp. (25)	20,700	29	32	26½	28	— ¾
46⅞	42⅜	2.00	Humble Oil & Ref. (25)	6,100	43½	46⅞	42⅜	46⅛	+2⅝
9¼	7⅝	0.50	Imperial Oil, Ltd. (No)	20,200	8½	9¼	8	9	+ ¼
1⅝	1¼	....	Indian Refining (10)	2,900	1½	1½	1¼	1¼	.....
10⅛	8¾	1.00	International Petr. (No)	33,700	9⅞	10	9⅛	9⅞	— ⅛
6½	5	....	Ohio Oil (No)	85,100	5⅝	6⅛	5⅛	5½	— ½
19	16	1.60	Pan Amer. P. & T. 'B' (50)	1,100	18	18	16	16	—3
5½	4	....	Phillips Petr. (No)	37,200	4⅝	5⅛	4	5	+ ⅛
7	4½	....	Prairie Oil & Gas (25)	12,100	5¼	5⅞	4½	5⅜	+ ⅛
5½	3⅞	....	Pure Oil (25)	15,100	4⅜	4⅞	4	4¼	— ¼
¾	½	....	Richfield Oil (No)	9,900	⅝	¾	½	⅝	.....
19⅞	13⅜	†2.28	Royal Dutch N. Y. (13⅓)	44,600	15⅝	19⅞	15¼	19	+3¾
9	6¾	....	Seaboard Oil (No)	28,000	7½	8¾	6¾	7⅞	+ ⅜
4	2¾	....	Shell Union (No)	26,200	3½	4	3	3⅝	+ ⅜
7⅛	4¼	....	Sinclair Consol. (No)	101,700	5¼	6⅛	4½	5¾	+ ½
4	2½	....	Skelly Oil (25)	5,300	3½	3¼	2½	3	.....
10¾	8¾	1.00	Socony-Vacuum (25)	258,800	9⅞	10¾	8¾	9⅞	.....
27	22½	2.00	Standard Oil of Calif. (No)	82,800	24	26¾	22½	24⅜	+ ⅜
16⅞	14	1.00	Standard Oil, Ind. (25)	99,500	16	16⅝	14⅝	15⅜	— ⅜
14⅛	12	1.60	Standard Oil, Ky. (10)	15,100	13½	14	12⅜	13¼	— ⅛
30½	25⅜	§2.00	Standard Oil, N. J. (25)	325,800	27¼	30⅜	25⅜	28⅜	+1
31	27⅜	1.00	Sun Oil (No)	3,600	28½	31	27⅜	30½	+2⅜
13⅞	10	1.00	Texas Corp. (25)	132,700	12	12⅞	10	11⅜	— ¼
3½	2⅜	....	Tide Water Assoc. (No)	35,900	2⅞	3½	2½	2¾	— ¼
13⅞	10¾	1.40	Union Oil of Calif. (25)	17,200	12¾	13	10¾	12	— ⅛
½	⅜	....	Venezuelan Petr. (5)	6,400	⅜	⅜	5/16	⅜	.....

[1] Since close of last month's table. † Paid for 1930—no regular rate. § Including extras.

The company secures a large part of its crude supplies from the mid-continent by pipeline, making payment in United States currency, so that the discount of the Canadian dollar operated to its disadvantage. Imperial received dividends of nearly $7,700,000 on its holdings of International Petroleum stock, equivalent to about 29 cents per share on its own outstanding stock.

THE United States Circuit Court in San Francisco cancelled the $12,000,000 Kern County Naval Oil Reserve leases to Pan-American Petroleum Company (California), which was formerly an E. L. Doheny enterprise, imputing them to the bribe given in 1921 to former Secretary of the Interior, Fall. This reverses a lower court decision which had upheld the leases. The Pan-American Company is now a part of the Richfield Oil Company, which is in receivership. It is understood that it carries a reserve in its balance sheet against the contingent liability of the loss of these leases. The company has no appeal except for a writ of review from the United States Supreme Court.

AT a special meeting on March 22 stockholders of Barnsdall Corporation will be asked to approve a reduction in the stated par value of the common stock from $25 to $5 a share and a reclassification into a single class of common instead of the class A and class B issues now outstanding. There are 2,258,779 shares of combined common now outstanding (almost wholly class A), and the reduction in par value will release to the surplus account $45,175,580. The management then proposes to write down to $1 the present book value of all investments in oil and gas leases, aggregating about $20,000,000. Nearly half of the newly released surplus will be used in this way. In future all lease purchases will be charged against current earnings, instead of being capitalized and having depletion subsequently deducted as a charge against earnings. Thus depletion due to production from leased properties and property abandonment charges will be eliminated from future income statements, which will as nearly as possible reflect cash earnings. It is explained that the proposed write-off will in no way affect taxation, but the reduction in par value will result in a substantial decrease in future transfer taxes.

COMPILATION of Carl H. Pforzheimer and Company covering first quarter dividends of the so-called Standard Oil companies shows the smallest aggregate cash disbursements since 1926. The estimated total is $46,717,367, compared with $48,530,230 in the fourth quarter of last year and with $63,101,997 in the first quarter a year ago.

MERGER of Sinclair Consolidated Oil Corporation, Prairie Oil and Gas Company and Prairie Pipe Line to form the Consolidated Oil Corporation was approved by the stockholders of all three companies at meetings on March 1. Eighty-eight percent of the stock of each of the Prairie companies voted in favor of the plan. Under the corporation laws of Kansas it was necessary to have 80 percent approval in order to effect the sale of assets to the new company. A small opposing minority of the Prairie Pipe Line stockholders caused to be made a part of the record demands that they be paid in cash the intrinsic and real value of their holdings. A detailed account of this important consolidation appeared in last month's WORLD PETROLEUM.

C. C. BAILEY

Paris Bourse Prices

1931 Div.	1931 Par	Share	January 15 to February 15 First	High	Low	Last	Change	Position on Feb. 15 1931
30 Lei	500 Lei	Astra Romana	59	72	52	70	+11	150
....	500 Lei	Colombia	52	75	46	75	+23	120
30 Lei	500 Lei	Concordia	42	52	40	52	+10	93
....	500 Fr.	Cdré. Gén des Pétroles act	..	..	..	..	..	..
....	500 Fr.	Cdré. Gén des Pétroles part	570	940	505	940	+370	..
....	500 Fr.	Franco Pol. Pétroles act	50	76	46	75	+25	95
....	....	Franco Pol. des Pétroles part	..	..	..	..	..	..
1 $	10 $	Franco Wyoming	147	170	141	168	+21	396
20 Fr.	500 Fr.	S. G. des Huiles de Pétrole act	205	270	190	260	+55	421
....	....	" " part	51	72	49	65	+14	151
....	500 Fr.	C. Française des Pétroles	..	410	..	..	..	..
40 Fr.	500 Fr.	C. Industrielle des Pétroles	430	501	430	500	+70	945
45 Fr.	500 Fr.	Lille Bonnières Colombes prio	680	680	605	617	−63	1001
20 Fr.	500 Fr.	" " ord	389	400	350	394	+5	703
....	500 Fr.	Malopolska act	27	33	27	32	+5	76
....	....	Malopolska part	..	292	101	320	..	500
....	....	Mexican Eagle	..	42	34	..	..	71
....	250 Fr.	Omnium Inter. des Pétroles	73	86	71	83	+10	189
50 Fr.	500 Fr.	Pechelbronn	450	483	450	455	+5	845
60 Fr. B.	500 Fr. B.	Petrofina	455	489	440	488	+33	590
170 Fl.	1000 Fl.	Royal Dutch	12940	14275	12350	14275	+1335	32250
17 Fl.	100 Fl.	Royal Dutch 1/10	1300	1450	1245	1450	+150	3270
3 Sh. 6	1 £	Shell	181	198	175	198	+17	472
....	500 Fr.	Steaua Française	185	220	185	211	+26	203

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Paris—February

SOCIÉTÉ Franco Americaine de Raffinage recently increased its capital from Fr. 20,000,000 to Fr. 50,000,000. Sixty thousand new shares of Fr. 500 each were issued at par and were subscribed to by four companies. No appeal for funds was made to the public.

NO balance sheet has yet been published by the Société Française des Carburants; but it is rumored that profits for the last financial year have considerably diminished and that no dividend is to be distributed. The company paid a dividend of Fr. 50.– for 1929–30 and profits amounted to Fr. 3,672,004.–

PETROLES de Grabownica, operating in Poland, announces that crude oil production amounted to 601,790 bbl. in 1931, or about 80,000 bbl. more than the previous year. Natural gas totalled 10,500,000 cu. ft., or an increase of 1,600,000 cu. ft. During the course of the year the company installed a plant for the production of gasoline from natural gas which yielded 10 percent more products than had been anticipated. Sums disbursed for drilling operations were reduced by 25 percent; nevertheless it is to be feared that when the company publishes its financial statement for the year there will be a substantial decrease in profits. Conditions in Poland are becoming more and more difficult. In most of the fields production is declining, and prices obtainable for products are very low. The Polish Government has done all that is humanly possible to protect the industry in every way; but money is more and more difficult to find for investment there owing to the tremendous losses sustained by the Sté de Pétroles de Dabrowa, the Crédit Général des Pétroles, and others.

A CERTAIN feeling of relief was experienced when the shareholders of the Crédit Général des Pétroles approved the accounts submitted to them for the financial year ending December 31, 1930. The Board of Directors faced a stormy meeting on January 21 when they were examined and cross-examined by different shareholders who eventually and rather unwillingly consented to a complete merger of the Crédit Général des Pétroles with the S. Malopolska with the object of creating an entirely new company to take over the whole of both companies' liabilities and the responsibility of converting all debts into 6 percent bonds, secured by mortgage and redeemable in 10 years time.

The Crédit Général des Pétroles' creditors appear to have agreed, as far as amortizements are concerned, to accept payments on a sliding scale. Thus only five percent will be due at the end of the

first year which works out at a total of Fr. 40,000,000.– The shares of both companies will be quoted at their nominal value for the purpose of the merger.

Since the above mentioned meeting took place the Crédit Général's shares have advanced 370 points.

HEAVY French buying during recent weeks has sent Royal Dutch shares from 107 percent to 167 percent on the Amsterdam bourse, or equivalent to a rise from $1.14 to $1.22 for the American shares.

E. J. ANDRÉ.

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London—February.

WITH business a little more active, wider fluctuations have occurred in the majority of oil share quotations, and a notable fact has been the tendency of this market to break away from the general trend of equity security prices. This was first apparent when renewed rumors of a price raising agreement between the "national" distributing companies and the "independents" in the British market brought in a demand for the leading oil shares, in which lower priced shares participated. In the absence of confirmation of the reports, prices relapsed, partly under the influence of a circular by a leading firm of brokers, usually well-informed on oil matters, taking a bearish view of immediate dividend prospects for such shares as Royal Dutch, Shells, Anglo-Persian and Burmah. Any subsequent support for prices has come chiefly from Paris, and fluctuations have been irregular, although practically all shares show an appreciable rise during the past month. Mexican Eagles were helped by the report that the company had secured a contract to supply the Mexican National Railways with 3,000,000 bbl. of fuel oil by under-bidding the previous suppliers.

ONE of the few really weak spots in the market was Attock, which sold down rapidly to well under ½ on a disappointing progress report to shareholders. The directors point out that as a consequence of disturbance in the Indian market for kerosene, the company's main product, average selling prices were much lower last year than in 1930. Production was also reduced from 191,249 to 138,806 bbl., and the volume of sales declined correspondingly. In consequence of these conditions, combined with the heavy cost of drilling to open up needed fresh oil supplies, revenue has not covered expenditure, and the year's accounts will show a considerable loss. The company, however, is fortunate in having a sound financial position.

STEAUA Romana (British) improved after the announcement of a final dividend of two percent, making a total of four percent on the ordinary shares for the year to June 30, 1931. No dividend was forthcoming from the Steaua Romana Société Anonyme, whose shares constitute the British company's largest asset, and the revenue of the latter consisted principally of interest on advances and profit arising out of trading rights. Net earnings for the past year, at £97,837, showed a decline of £35,294 on the figure for 1929–30. Major items in the balance sheet are £1,124,884 representing shareholdings in and trading rights with the Roumanian company, advances of £425,514 to that concern, and a loan of £675,645 to a Roumanian banking group, partly secured on the Roumanian company's shares. The British company's auditors, in their remarks on the accounts, suggest that the Roumanian shares are overvalued. Their certification of the accounts is subject to this observation, and also to the soundness of the advances made in Roumania. This fact provides sufficient explanation for the low price of the British company's ordinary shares.

UNITED British Oilfields of Trinidad, an associate of the Royal Dutch-Shell group, is adopting a novel expedient for raising fresh capital, applicants for new shares being offered a commission of 2½ percent. The directors propose to issue 1,050,000 of the unissued shares as eight percent cumulative preference shares of 6s. 8d. each. In addition to their fixed dividend the preference shares will be entitled to one-fourth of remaining divisible profits. These shares will be offered to holders of the present ordinary shares at par in the proportion of seven new shares for every ten shares now held. The underwriters of the issue are the Anglo-Saxon Petroleum Company, one of the principal Royal Dutch-Shell subsidiaries, and they will cede every allottee of the new shares a commission of 2½ percent. Proceeds of the issue will repay bank loans of £125,000, provide £115,000 for new refinery and better loading facilities, and leave about £100,000 for additional working capital.

PARTICULARS recently filed in Great Britain indicate another step in organizing combined distribution by the Royal Dutch-Shell Group and Anglo-Persian in the British market for petroleum products. The nominal capital of Shell-Mex and B. P. has been increased from £100 to £8,925,000, and at the same time the nominal capital of Shell Refineries, Limited, has been raised from £100 to £700,000. These two companies were formed towards the end of 1931 to carry out the agreement between Anglo-Persian, Burmah, the Mexican and Canadian Eagle Oil Companies and Royal-Dutch Shell.

The latest increase in the Shell-Mex and B. P. capital, according to particulars filed, was for the purpose of acquiring all the business of Shell-Mex except refining, and also to take over the British Petroleum Company and the Scottish Oil Agency, Glasgow. Shell-Mex is the British distributing company of Royal Dutch-Shell, and the other two acquired companies distribute for Anglo-Persian. Shell Refineries' capital was increased chiefly to acquire the refining and kindred businesses of Shell-Mex. The last mentioned company is therefore divided up, its refining activities going to Shell Refineries, while the distributing end is taken over by Shell-Mex and B. P. The significance of this development, and the increases of capital which it has occasioned, lies in the indication given that existing arrangements in the British market are likely to be permanent.

ALEC. H. DAY.

London Stock Exchange Prices

1931 High	1931 Low	Last Year's Div. % per Ann.	Share	January 15 to February 15 First	High	Low	Last	Change
9/16	1/4	.....	Anglo-Ecuadorian	5/16	5/16	9/32	5/16	.....
2 3/8	1	17½	Anglo-Egyptian "B"	1 3/32	1 1/4	1 3/32	1 3/16	+ 3/32
2 13/32	1 3/8	15	Anglo-Persian	1 23/32	1 29/32	1 23/32	1 27/32	+ 1/8
5/8	9/32	20	Apex Trinidad (5s.)	17/32	9/16	½ †	9/16 †	+ 1/32
3 1/32	7/16	.....	Attock	2 1/32	2 1/32	7/16	9/16	− 3/32
5/16	1/8	5*	Brit. Borneo (6s.)	7/32	7/32	5/16	7/32	.....
7/32	5/32	5¼	Brit. Burmah (8s.)	5/16	5/16	5/16	5/16	.....
5/32	1/16	.....	Brit. Controlled ($5)	1/16	5/32	1/16	1/16	.....
1/4	1/16	.....	Brit. Controlled Pfd. ($5)	1/8	1/8	1/8	1/8	.....
3 5/8	1 1/2	22½	Burmah	1 27/32	1 15/16	1 27/32	1 29/32	+ 1/16
1 5/32	7/32	12c.	Canadian Eagle (No par)	9/32	1 1/32	9/32	1 1/32	+ 1/16
1 1/16	3/8	.....	Creole (No par)	17/32	19/32	17/32	19/32	+ 1/16
5/32	1/16	.....	Kern River (10s.)	3/32	1/8	3/32	3/32	.....
1 1/8	1 1/16	10	Lobitos	3 1/32	1 7/32	2 1/32	1 1/8	+ 5/32
17/32	9/32	6	Mexican Eagle ($4 Mex.)	1 1/32	3/8	5/16	3/8	+ 1/32
36 1/2	22	40c.	Pan American "B" ($50)	26	26 1/4	23 1/2	23 1/2	− 2 1/2
3/4	5/32	2½	Phoenix	7/32	7/32	7/16	7/16	− 1/32
26 5/16	9 3/4	17	Royal Dutch (fl. 100)	14 3/4	16 1/2	14	16 3/4	+ 1 3/4
3 27/32	1 15/32	17½*	Shell Transport	1 29/32	2 5/32	1 7/8	2 1/8	+ 7/32
9/32	5/32	4	Steaua Romana	3/16	1/4	3/16 †	7/32 †	+ 1/32
1 15/32	1/2	5	Trinidad Leasehold	1 1/4	1 3/8	1 1/4	1 11/32	+ 3/32
9/32	1/8	.....	Untd. Brit. of Trinidad (6s. 8d.)	5/32	5/16	5/32	5/32	.....
1 25/32	2 5/32	17½	Venezuelan Oil Concessions	2 1/32	1 7/32	2 1/32	1 1/16	+ 3/32

Nominal value of shares £1 unless otherwise stated by bracketed figures.
* Denotes Tax-free dividend. † Denotes "Ex-dividend" price.
c. Denotes cent per share.

Western Kansas—A New Oil Empire

(Continued from page 109)

portation and marketing facilities; but enough is already known to consider the Barton Arch of primary importance. The fact that all of the great Mid-Continent oil fields have been directly associated with structures of truncated type is alone a most forceful indication that the Barton Arch will develop many fields, and it is but reasonable to predict that some place on the Arch, or on its truncated flanks, a major reservoir, or reservoirs, will be found, inasmuch as completions to date already suggest a development of vast magnitude with but a minor fraction of the Arch area explored by the drill.

No fewer than 34 oil and gas fields have been discovered in the last few years in the area related to the Barton Arch, along its northeastern and eastern rim. Of this total 20 fields have not been developed, or produced, and still have but one well each. Arbuckle dolomitic limestone of the Cambro-Ordovician is at this time the principal potential horizon, though more oil has been produced to date from the Oswald limestone of the lower Pennsylvanian. The "Gorham Sand," the overlapping basal conglomerate, has been found productive of oil and gas in several localities on the Arch, but little is known yet of its possibilities.

Many new fields may be discovered in the area of the Barton Arch. Within the next few years the southwestern flank of the Arch will probably be proven for production, this area roughly comprising the Pawnee, Ness and Gove Counties. Also the axis of the Arch, Barton, Rush, Ellis and Trego Counties, presents a most attractive wildcatting territory, and the development within it of important oil and gas production is hardly to be questioned.

Hugoton Gas Field

THE immense Hugoton gas field, discovered in 1927, was developed in 1930 and 1931, after the projected natural gas pipelines had been assured. Production is found in dolomitic limestones, of variable porosity, the reservoir being formed by an eastward dipping terrace and westward pinching out of porous dolomitic limestones, which gradually change into shales to the west. The producing zone, encountered at from 2,600 to 2,900 ft., is of lower marine Permian age. The gas is free from sulfur (sweet) and contains 1,100 B.t.u.'s per 1,000 cu. ft.

A total of 133 wells has been completed in the Hugoton field, showing a potential of 870,000,000 cu. ft. per day, or a per well average of 6,500,000 cu. ft. The spacing of wells has been extremely conservative, based on one well per 160 acres, though to date but a fraction of this plan has been executed. An area of 600 sq. miles, or 384,000 acres, has been proven for production, and possibly an equally large area has been semi-proven. Gas reserves of the Hugoton field are immense.

A conservative estimate places the reserves of definitely proven portion of the field at 2,000,000,000,000 cu. ft., while the total reserves are probably in excess of 3,000,000,000,000 cu. ft., or sufficient for about 82 years at the withdrawal rate of 100,000,000 cu. ft. per day. This reserve is equivalent to 600,000,000 bbl. of high gravity crude oil, the conversion factor being based on the heat values. The natural gas reserve in the Hugoton field is calculated on the basis of producing zone being 50 ft. thick, having an average porosity of 15 percent, an average initial pressure of 440 lb. per sq. in., and a recovery of 50 percent.

Thus, relatively, the Hugoton field is fully comparable, in value and importance, to the East Texas field (Rusk-Gregg), yet in the Hugoton field there is no waste, either in the field, when produced, or ultimate, when consumed, while in East Texas there is a great waste of natural gas in the field, and consequently of oil, and ultimately much of its crude oil is consumed as fuel oil and not as gasoline, which is a great waste of thermal energy.

In addition to serving local markets in Kansas and Colorado, the gas from Hugoton field is carried via two huge pipe line projects to Omaha, Iowa and Indiana markets, some 900 miles eastward.

Summary

THOUGH the active development of western Kansas dates back only to 1929, results achieved to date indicate that it is an area of paramount importance. Prior to 1929 but 23 small pools had been opened in western Kansas, while in the following three years 39 pools were discovered, three of them in the major class. Of the present total of 64 oil and gas pools, fully 30 are one well fields, delayed in their development by the overproduction in the country at large.

The indicated proven and semi-proven crude oil reserves of western Kansas are here placed at some 220,000,000 bbl., while its production to date has reached 30,000,000 bbl., of which total 11,770,000 bbl. have been produced in 1931, this figure representing 30 percent of the total Kansas production for that year. In the light of developments to date the total crude oil reserves of western Kansas can be estimated at around 700,000,000 bbl. Large fields will undoubtedly be discovered in association with the Barton Arch and in the McPherson-Salina area. New major anticlinal features may be discovered southwest of the Barton Arch and north of the Hugoton field, thus opening new counties of western Kansas for most promising wildcatting.

Natural gas reserves of western Kansas have been proven to be very great; a total recoverable volume of 4,000,000,000,000 cu. ft. has already been assured, that figure representing an equivalent of 760,000,000 bbl. of crude oil.

New capital has been poured into western Kansas. A total of 1,500 wells drilled to date represents an investment of around $50,000,000 in drilling alone. The cumulative cost of leaseholds has been very large. Whole counties have been, and are now, leased solidly by major operators. Crude oil pipe lines have been laid down in the eastern part of western Kansas, while natural gas pipe lines tap the opened reserves to supply far away industrial centers.

A new oil empire is being built. A famous wheat country is becoming also a great source of modern fuels.

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Liquefied Petroleum Progress

LIQUEFIED petroleum gases, namely, propane and butane, two of the lower members of the paraffin hydrocarbon series, are finding increased industrial and domestic uses, figures from the United States Bureau of Mines show. A survey made by E. B. Swanson, chief petroleum economist, disclosed the fact that 678,734 bbl. of the so called "bottled gases" were distributed in 1931, representing an increase of 58 percent over 1930. The consumption was divided into three classes, (1) domestic 54 percent, (2) gas manufacturing 24 percent, and (3) industrial and miscellaneous 22 percent.

Propane (boiling point minus 44 deg. Fahr.) is a gas at atmospheric pressures and ordinary temperatures, but may be liquefied under moderate pressures, and transported in cylinders, drums, pipe lines, and tank cars. Since it flashes into a gas at any temperature above minus 44 deg. F., it finds one of its most important uses as a fuel for gas stoves in homes, boats, clubs and the like, which are inaccessible to a central gas distributing systems. It is estimated that there were about 150,000 "bottled gas" users in 1931, an increase of 750 percent since 1928. The greater part of the domestic consumption was utilized in this manner.

Butane (boiling point 34 deg. F.) is not ordinarily used as bottled gas because temperatures are frequently too low to permit self evaporation. Use of butane, designated by class two above, has been confined chiefly to the "butane-air gas plants" for communities too small to support an ordinary gas manufacturing plant or not connected with natural gas pipe lines.

New uses reported for liquefied petroleum gases include an industrial application to cotton singeing.